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FLOOD INSURANCE STUDY

BOROUGH OF PARAMUS, NEW JERSEY
BERGEN COUNTY

JULY 15, 1988

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Federal Emergency Management Agency

COMMUNITY NUMBER - 340062

COMPLETED

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
	1.1 Purpose of Study	1
	1.2 Authority and Acknowledgements	1
	1.3 Coordination	1
2.0	AREA STUDIED	2
	2.1 Scope of Study	2
	2.2 Community Description	4
	2.3 Principal Flood Problems	5
	2.4 Flood Protection Measures	5
3.0	ENGINEERING METHODS	6
	3.1 Hydrologic Analyses	6
	3.2 Hydraulic Analyses	8
4.0	FLOOD PLAIN MANAGEMENT APPLICATIONS	10
	4.1 Flood Boundaries	10
	4.2 Floodways	10
5.0	INSURANCE APPLICATION	11
	5.1 Reach Determinations	18
	5.2 Flood Hazard Factors	19
	5.3 Flood Insurance Zones	19
	5.4 Flood Insurance Rate Map Description	20

TABLE OF CONTENTS - continued

	Page
6.0 OTHER STUDIES	20
7.0 LOCATION OF DATA	20
8.0 BIBLIOGRAPHY AND REFERENCES	23

FIGURES

Figure 1 - Vicinity Map	3
Figure 2 - Floodway Schematic	18

TABLES

Table 1 - Summary of Discharges	7 - 8
Table 2 - Floodway Data	12 - 17
Table 3 - Flood Insurance Zone Data	21 - 22

EXHIBITS

Exhibit 1 - Flood Profiles		
Saddle River	Panels 01P-11P	pg 25-35
Sprout Brook	Panels 12P-19P	pg 36-43
Mannings Brook	Panels 20P-21P	pg 44-45
Van Saun Mill Brook	Panels 22P-26P	pg 46-50
Coles Brook	Panels 27P-28P	pg 51-52
Behnke Brook	Panels 29P-31P	pg 53-55
Herring Brook	Panels 32P-34P	pg 56-58
Exhibit 2 - Flood Boundary and Floodway Map Index		
Flood Boundary and Floodway Map		

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
BOROUGH OF PARAMUS, NEW JERSEY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Borough of Paramus, Bergen County, New Jersey, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgements

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic analyses for the original study were prepared by URS Company, Inc. and the New Jersey Department of Environmental Protection, and the hydraulic analyses were prepared by URS Company, Inc., for the Federal Emergency Management Agency, under Contract No. H-4808. This work was completed in September 1981.

In this updated study, the hydraulic analyses for portions of the Saddle River were revised by Dewberry and Davis based on information supplied by Medick-Langus-Feinen Architects, and Canger Engineering Associates. This work was completed in January 1987.

1.3 Coordination

On May 17, 1979, streams requiring detailed study were identified at an initial Consultation and Coordination Officer's (CCO) meeting attended by representatives of FEMA, the Borough of Paramus, and URS Company, Inc. (the study contractor). A search for basic data was made at all levels

of government, including local officials. In June 1979, a letter was submitted to the mayor and borough engineer requesting any available information related to topographic data, past flood problems, local flood protection improvements, and the history of the borough.

An intermediate CCO meeting was held on October 5, 1981, with representatives of FEMA, the borough, and the study contractor to review preliminary floodplain delineations.

On December 2, 1982, the results of the original study were reviewed at a final CCO meeting attended by representatives of the FEMA, the borough, and the study contractor.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Borough of Paramus, Bergen County, New Jersey. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods: the Saddle River, Sprout Brook, Coles Brook, and Herring Brook, for their entire lengths within the community; Mannings Brook, from its confluence with Sprout Brook to Van Binsberger Boulevard extended; Van Saun Mill Brook, from the downstream corporate limits to a point approximately 1,140 feet upstream of Continental Avenue; and Behnke Brook, from its confluence with Herring Brook to a point approximately 60 feet upstream of Midland Avenue. In addition, a shallow flooding area at the culvert under the Korvettes parking lot and State Route 4 was studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through September 1986.

For this revision, the Saddle River was restudied from approximately 0.5 mile downstream of Linwood Avenue to Linwood Avenue. This was done to reflect the effects of fill placed in the Saddle River floodplain in the area of the Glenwood Villas development near Pierce Drive in the northwest portion of Paramus.

Several unnamed tributaries and the remaining portions of Van Saun Mill Brook and Behnke Brook were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by, FEMA and the Borough of Paramus.

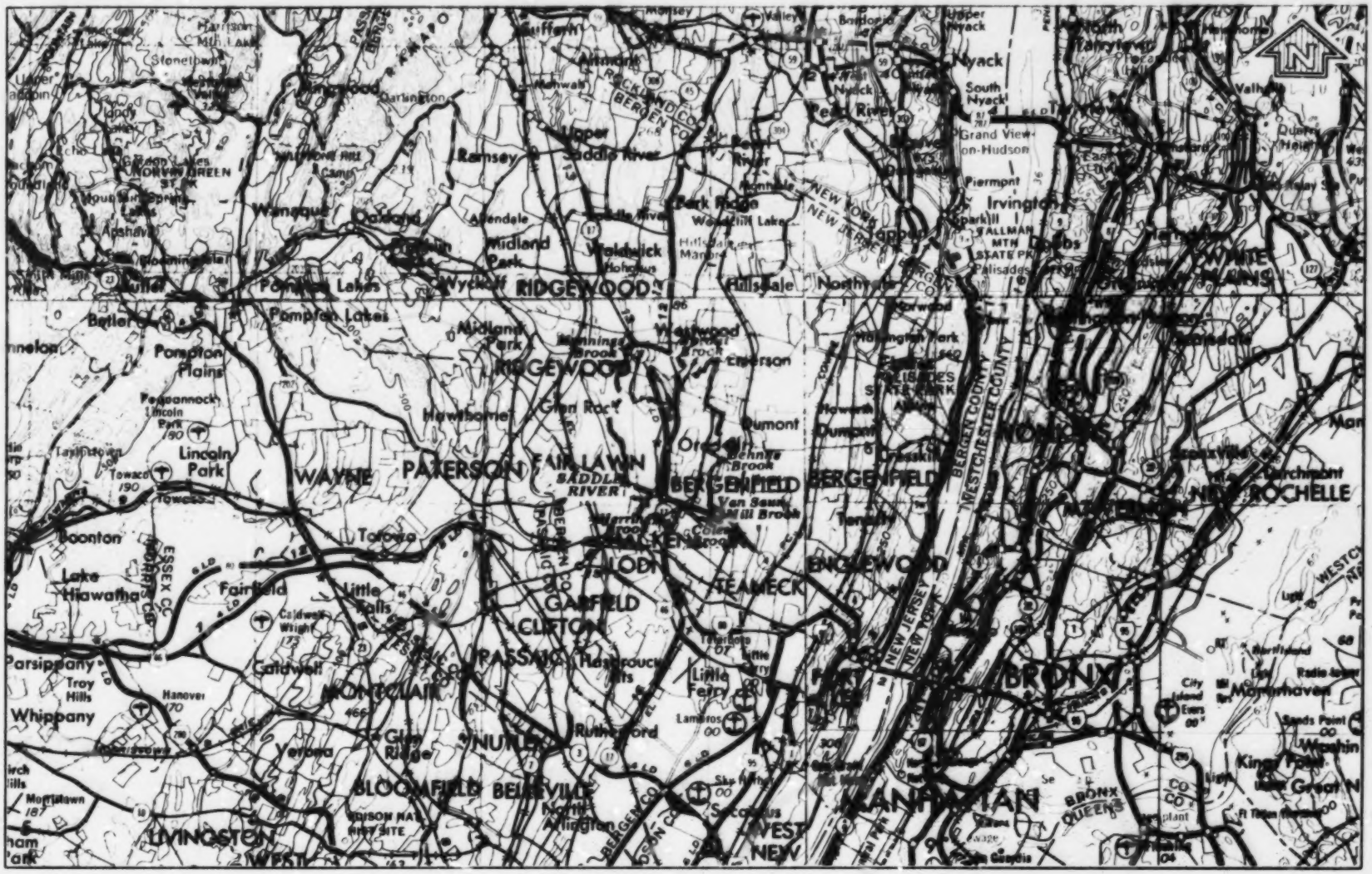

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

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2.2 Community Description

The Borough of Paramus is located in the central portion of Bergen County in northeastern New Jersey, approximately 15 miles from the center of New York City. It is bordered by the Borough of Westwood and the Township of Washington to the north, the Borough of Emerson to the northeast, the Boroughs of Oradell and River Edge to the east, the City of Hackensack to the southeast, the Township of Rochelle Park and the Borough of Maywood to the south, the Township of Saddle Brook to the southwest, the Boroughs of Fair Lawn and Glen Rock to the west, and the Village of Ridgewood to the northwest. Paramus, which was incorporated in 1922, is a suburban, predominately single-family residential community and is part of the New York-New Jersey metropolitan region. In addition to its residential character, Paramus has some of the nation's largest commercial centers.

Presently, there are approximately 30,945 persons residing within the borough's total land area of 10.2 square miles. There is every reason to expect a continued growth in virtually all of the commercial activities presently being conducted within the borough. The boroughs dominant position as a regional retail center is expected to continue and grow in significance.

Paramus lies at the foothills of the Ramapo Mountains within the Glaciated Piedmont Zone. The topography varies substantially throughout the community. Elevations vary from approximately 10 feet at the confluence of Coles Brook and Van Saun Mill Brook, which is the southeasternmost point in the borough, to as high as 180 feet on Fairview Avenue between Heights Road and Circle Drive. There are many poorly drained areas within the community, which consist mainly of low-lying peat beds along the Saddle River, Sprout Brook, Mannings Brook, Saint Brook, and the headwaters of Herring Brook.

A moderate climate prevails throughout the area, with an average annual temperature of approximately 50 degrees Fahrenheit (°F). The average annual precipitation is approximately 46 inches.

The Saddle River enters Paramus from the north at Linwood Avenue and flows south forming most of the western border of the borough. Sprout Brook and its three principal tributaries - Mannings Brook, Saint Andrews Brook, and Delford Brook - are centrally located within Paramus. Sprout Brook flows south from just upstream of the confluence of Mannings Brook to the downstream corporate limits. Mannings Brook and Saint Andrews Brook flow southeast and northeast, respectively, to their confluences with Sprout Brook just east of State Route 17 near Paramus Mall.

Van Saun Mill Brook and Coles Brook form the eastern border of the borough. Van Saun Mill Brook flows south and east while Coles Brook

flows north and east before they join at the southeasternmost part of Paramus just south of State Route 4. Behnke Brook flows southeast to its confluence with Herring Brook, which is immediately east of Forest Avenue. Herring Brook flows northeast from its confluence with Van Saun Mill Brook.

2.3 Principal Flood Problems

Flooding along all streams within the borough has occurred as a consequence of heavy rains resulting from localized thunderstorms and hurricanes during the summer and fall. The most severe flooding within the borough resulted from a thunderstorm on November 8, 1977. The U. S. Geological Survey (USGS) gage on the Saddle River at Ridgewood recorded a peak discharge of 4,650 cubic feet per second (cfs) for this flood, as compared to the 2,920 cfs recorded during Hurricane Doria in 1971 (Reference 1). Based on the hydrology developed for this study, the 1977 flood had a recurrence interval of slightly less than 100 years. Major flooding also occurred in 1945, 1955, and 1968. Although limited information is available, several sources suggest that the flood of July 23, 1945, may have been of greater magnitude than the 1977 flood.

Because of the large amounts of land which have been paved for highways and parking lots, times of concentration of runoff are shorter. In many areas, this tends to cause flash floods on some of the smaller streams.

The Saddle River channel is of insufficient capacity to contain moderately increased flows and, therefore, during a heavy thunderstorm or extended periods of rainfall, flooding is likely to occur. Sprout Brook has a large floodplain, with some areas over 1,500 feet wide. Several large buildings on Century Road are within the flood boundaries.

The floodplain along Mannings Brook is also large, however, it is mainly undeveloped. The floodplains of Behnke Brook and Herring Brook are relatively narrow, having only a few residential and commercial structures located within the 100-year flood boundaries. Van Saun Mill Brook and Coles Brook also have narrow floodplains. Most of the Van Saun Mill Brook floodplain is contained within a borough park.

2.4 Flood Protection Measures

Paramus has adopted ordinances that define the flood hazard areas as specified by the FEMA (References 2 and 3). In addition, the ordinances provide regulations for development within the area.

Paramus has undertaken extensive channelization improvements along the Saddle River and Sprout Brook. Dredging and straightening of the Saddle River were begun in the late 1960s and are still in progress today. In

addition, hydraulic structures have been enlarged to safely pass flood flows. A similar program for Sprout Brook has been in progress since 1974.

Two vehicular bridges at East Ridgewood Avenue and Grove Street, which had insufficient capacity to convey flood flows, have been replaced by the county.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10) and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

Discharges for the Saddle River were developed by utilizing data for selected flood flows between 1965 and 1977 as recorded at the Ridgewood gage (No. 01390500), the Dunkerhook gage (No. 01391110), and the Lodi gage (No. 1391500). Transfer coefficients were calibrated to reflect the conveyance characteristics by using the drainage area proportioning formula:

$$Q_1/Q_2 = (A_1/A_2)^n$$

where "n" is the transfer coefficient, Q_1 and Q_2 are the discharges at the transposed point and at the gage, respectively, and A_1 and A_2 are respective drainage areas at those points (Reference 4). These transfer coefficients were then applied to the USGS log-Pearson Type III analysis at each appropriate gage to develop peak discharges for floods of the selected recurrence intervals. Due to storage in the floodplain, discharges on the Saddle River decrease as the drainage area increases.

For Sprout Brook, Mannings Brook, Van Saun Mill Brook, Coles Brook, Behnke Brook, and Herring Brook, discharges were developed using Special Report 38 (Reference 5). Special Report 38 is based on a regression analysis of 103 gages in New Jersey and is used to estimate peak-flood magnitudes having selected recurrence intervals for drainage basins larger than 1 square mile with various degrees of urban or suburban development. Parameters used in this method included basin size, channel slope, surface storage, and population density.

A summary of drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
SADDLE RIVER					
At the downstream corporate limits	47.7	3,280	6,305	8,130	14,055
Upstream of State Route 4	46.8	3,360	6,540	8,480	14,855
Upstream of the confluence of Hohokus Brook	23.2	2,475	4,950	6,490	11,690
SPROUT BROOK					
At the downstream corporate limits	5.56	445	720	870	1,295
Upstream of Century Road	4.89	410	665	805	1,190
MANNINGS BROOK					
At the confluence with Sprout Brook	1.30	110	185	230	350
VAN SAUN MILL BROOK					
At the confluence with Coles Brook	5.31	665	1,060	1,280	1,895
Upstream of the confluence of Herring Brook	1.21	240	395	485	735

TABLE 1 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
COLES BROOK					
At the confluence of Van Saun Mill Brook	1.96	435	685	830	1,215
BEHNKE BROOK					
At the confluence with Herring Brook	1.43	370	600	735	1,105
HERRING BROOK					
At the confluence of Behnke Brook	2.76	440	715	870	1,290
Upstream of the confluence of Behnke Brook	1.33	170	280	345	520

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flooding sources.

For the Saddle River north of the confluence of Hohokus Brook, as well as for Sprout Brook, Mannings Brook, Van Saun Mill Brook, Coles Brook, Behnke Brook, and Herring Brook, channel cross sections and partial overbank cross sections were obtained through field surveys. The overbanks were extended using topographic maps at a scale of 1:1,200 with a contour interval of 2 feet (Reference 6). For the Saddle River south of the confluence of Hohokus Brook, channel cross sections and partial overbank cross sections were obtained from the New Jersey Department of Environmental Protection. Cross sections were located at close intervals above and below bridges and culverts in order to compute significant backwater effects of those structures. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

For the revised portion of the Saddle River, cross sections were taken from topographic maps at a scale of 1:600 with a contour interval of 1 foot, and from USGS topographic maps at a scale of 1:24,000 with a contour of 10 feet (References 7 and 8).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the U. S. Army Corps of Engineers (COE) HEC-2 step-backwater computer program (Reference 9). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Starting water-surface elevations for the Saddle River were obtained from the Flood Insurance Study for the Township of Rochelle Park (Reference 10). Starting water- surface elevations for Van Saun Mill Brook were obtained from the Flood Insurance Study for the City of Hackensack (Reference 11). Starting water-surface elevations for Sprout Brook, Mannings Brook, Coles Brook, Behnke Brook, and Herring Brook were determined using the slope/area method.

Channel roughness factors (Manning's "n") used in the hydraulic computations were assigned on the basis of field inspection of various cross sections in the floodplain areas. The channel "n" values and overbank "n" values for the streams studied by detailed methods are shown as follows:

Stream	Channel "n"	Overbank "n"
Saddle River	0.020-0.045	0.045-0.090
Sprout Brook	0.030-0.046	0.020-0.068
Mannings Brook	0.022-0.030	0.040-0.060
Van Saun Mill Brook	0.022-0.033	0.050-0.090
Coles Brook	0.020-0.038	0.050-0.060
Behnke Brook	0.030-0.037	0.040-0.090
Herring Brook	0.025-0.033	0.035-0.080

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For the streams studied by approximate methods, the extent of 100-year flooding was determined using USGS Open-File Report 79-419 (Reference 12).

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing floodplain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps (Reference 6).

For the revised portion of the Saddle River, flood boundaries between cross sections were interpolated using topographic maps at a scale of 1:600 with a contour interval of 1 foot (Reference 7).

For the streams studied by approximate methods, the boundary of the 100-year flood was delineated using the topographic maps referenced above.

The 100- and 500-year floodplain boundaries are shown on the Flood Boundary and Floodway Map (Exhibit 2). In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal

standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

However, the State of New Jersey has established criteria limiting the increase in flood heights to 0.2 foot. Thus, floodways having no more than a 0.2-foot surcharge have been delineated for this study.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the floodplain. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the floodway and the 100-year floodplain boundaries are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway widths for the Saddle River, Van Saun Mill Brook, and Coles Brook extend beyond the corporate limits.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 0.2 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2 for certain downstream cross sections of Sprout Brook, Mannings Brook, Coles Brook, and Herring Brook are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail in the Borough of Paramus.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Saddle River								
A	29,650	273/78	2,064	3.9	46.2	46.2	46.4	0.2
B	30,475	387/112	2,494	3.3	46.8	46.8	47.0	0.2
C	31,330	175/45	1,492	5.4	47.4	47.4	47.6	0.2
D	31,546	74/50	960	8.5	48.1	48.1	48.2	0.1
E	32,112	70/45	866	9.4	49.2	49.2	49.3	0.1
F	34,008	806/365	6,610	1.3	51.2	51.2	51.3	0.1
G	36,130	857/285	6,152	1.4	51.4	51.4	51.5	0.1
H	39,035	743/290	4,624	1.8	53.1	53.1	53.3	0.2
I	40,070	506/345	2,672	3.2	53.5	53.5	53.7	0.2
J	41,000	476/430	2,615	3.5	54.4	54.4	54.6	0.2
K	42,000	646/280	3,989	2.3	55.8	55.8	56.0	0.2
L	44,110	868/490	4,393	2.1	56.6	56.6	56.8	0.2
M	44,985	737/285	3,141	2.1	57.1	57.1	57.3	0.2
N	46,505	959/60	3,769	1.7	58.5	58.5	58.7	0.2
O	48,285	390/234	2,547	2.5	62.5	62.5	62.6	0.1
P	48,985	813/713	4,372	1.5	63.0	63.0	63.2	0.2
Q	49,585	573/285	2,739	2.4	63.4	63.4	63.6	0.2
R	50,385	453/380	2,331	2.8	64.5	64.5	64.7	0.2
S	51,170	382/300	1,568	4.1	65.7	65.7	65.9	0.2
T	51,840	522/404	2,051	3.2	67.2	67.2	67.3	0.1
U	52,930	286/71	1,276	5.1	69.5	69.5	69.6	0.1
V	55,145	411/200	1,918	3.6	74.3	74.3	74.5	0.2

[1]Feet above confluence with Passaic River
[2]Width/width within corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ

(BERGEN CO.)

FLOODWAY DATA

SADDLE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Sprout Brook								
A	1,030	45	195	4.5	42.4	40.9[2]	41.0	0.1
B	2,118	53	292	3.0	42.7	42.7	42.7	0.0
C	3,065	47	319	2.7	43.7	43.7	43.9	0.2
D	3,945	68	376	2.3	44.4	44.4	44.5	0.1
E	4,667	51	360	2.4	44.8	44.8	45.0	0.2
F	5,145	119	614	1.4	45.1	45.1	45.3	0.2
G	5,740	142	644	1.4	45.2	45.2	45.4	0.2
H	6,600	61	343	2.5	45.5	45.5	45.7	0.2
I	7,500	51	296	2.7	46.2	46.2	46.3	0.1
J	8,230	132	680	1.2	46.4	46.4	46.5	0.1
K	8,610	183	833	1.0	46.4	46.4	46.5	0.1
L	10,320	50	305	2.6	46.6	46.6	46.8	0.2
M	10,845	43	251	3.2	46.7	46.7	46.9	0.2
N	11,825	72	346	2.3	47.1	47.1	47.3	0.2
O	12,580	27	111	7.3	47.1	47.1	47.3	0.2
P	13,105	56	185	4.4	48.7	48.7	48.7	0.0
Q	13,675	34	151	5.3	49.7	49.7	49.7	0.0
R	14,806	53	238	3.4	51.1	51.1	51.1	0.0
S	15,538	52	233	3.4	51.7	51.7	51.7	0.0
T	15,987	152	606	1.3	52.0	52.0	52.0	0.0
U	16,853	100	628	1.3	52.2	52.2	52.3	0.1
V	17,432	72	351	2.3	52.2	52.2	52.3	0.1
W	18,310	121	459	1.8	52.7	52.7	52.9	0.2
X	18,595	99	446	1.8	52.8	52.8	53.0	0.2

[1]Feet above corporate limits

[2]Elevation computed without consideration of backwater effects from Saddle River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ

(BERGEN CO.)

FLOODWAY DATA

SPROUT BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						(FEET NGVD)		
Mannings Brook								
A	48[1]	29	85	2.7	52.7	49.5[4]	49.7	0.2
B	234[1]	40	93	2.5	52.7	49.7[4]	49.8	0.1
C	715[1]	18	56	4.1	52.7	50.1[4]	50.3	0.2
D	1,048[1]	49	123	1.9	52.7	50.7[4]	50.8	0.1
E	1,994[1]	49	95	2.4	52.7	51.5[4]	51.7	0.2
F	2,445[1]	32	66	3.5	52.7	52.4[4]	52.4	0.0
G	3,068[1]	29	68	3.4	53.1	53.1	53.3	0.2
H	3,390[1]	25	61	3.8	53.7	53.7	53.8	0.1
I	3,760[1]	17	58	4.0	54.3	54.3	54.4	0.1
Van Saun Mill Brook								
A	195[2]	52/25[3]	308	3.9	16.1	16.1	16.3	0.2
B	450[2]	128/75[3]	829	1.4	17.6	17.6	17.8	0.2
C	825[2]	154/50[3]	823	1.5	17.6	17.6	17.8	0.2
D	1,375[2]	77/35[3]	421	2.8	17.7	17.7	17.9	0.2
E	1,870[2]	99/50[3]	411	2.9	17.8	17.8	18.0	0.2
F	2,245[2]	52/20[3]	333	3.6	18.1	18.1	18.3	0.2
G	2,585[2]	94/75[3]	464	2.6	18.5	18.5	18.7	0.2
H	2,850[2]	59/30[3]	305	3.9	18.5	18.5	18.7	0.2
I	3,455[2]	95/65[3]	439	2.7	19.3	19.3	19.4	0.1
J	3,865[2]	62/40[3]	309	3.9	19.5	19.5	19.7	0.2

[1]Feet above confluence with Sprout Brook

[2]Feet above corporate limits

[3]Width/width within corporate limits

[4]Elevation computed without consideration of backwater effects from Sprout Brook

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ

(BERGEN CO.)

FLOODWAY DATA

MANNINGS BROOK AND VAN SAUN MILL BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH[3] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						(FEET NGVD)		
Van Saun Mill Brook (continued)								
K	4,750[1]	84/25	456	2.6	27.5	27.5	27.6	0.1
L	5,145[1]	78/45	322	3.7	27.6	27.6	27.7	0.1
M	6,195[1]	208/100	1,611	0.7	30.9	30.9	30.9	0.0
N	6,700[1]	43/30	257	4.7	30.9	30.9	30.9	0.0
O	7,280[1]	123/20	396	3.0	31.5	31.5	31.6	0.1
P	7,970[1]	29/15	137	3.6	31.7	31.7	31.9	0.2
Q	8,590[1]	200/87	737	0.7	36.9	36.9	37.1	0.2
R	8,870[1]	105/75	288	1.7	36.9	36.9	37.1	0.2
S	9,120[1]	65/50	138	3.5	36.9	36.9	37.1	0.2
T	9,690[1]	20/10	182	2.7	43.1	43.1	43.3	0.2
U	10,300[1]	37/25	154	3.2	44.2	44.2	44.4	0.2
V	10,685[1]	35/15	107	4.5	45.2	45.2	45.3	0.1
W	11,310[1]	52/43	162	3.0	46.6	46.6	46.6	0.0
X	11,780[1]	90/78	259	1.9	47.3	47.3	47.5	0.2
Coles Brook								
A	4,900[2]	67/10	202	4.1	16.1	13.6[4]	13.8	0.2
B	5,400[2]	28/10	104	8.0	16.1	14.3[4]	14.5	0.2
C	6,240[2]	55/38	191	4.4	18.2	18.2	18.3	0.1
D	6,845[2]	50/25	182	4.6	19.4	19.4	19.6	0.2
E	7,475[2]	44/20	126	6.6	21.3	21.3	21.5	0.2

[1]Feet above corporate limits

[2]Feet above confluence with Hackensack River

[3]Width/width within corporate limits

[4]Elevation computed without consideration of backwater effects from Van Saun Mill Brook

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ

(BERGEN CO.)

FLOODWAY DATA

VAN SAUN MILL BROOK AND COLES BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Behnke Brook								
A	50	133	231	3.2	31.7	31.7	31.9	0.2
B	220	161	358	2.1	32.5	32.5	32.6	0.1
C	610	144	463	1.6	33.0	33.0	33.1	0.1
D	1,180	201	652	1.1	33.3	33.3	33.4	0.1
E	1,890	150	261	2.8	34.9	34.9	35.0	0.1
F	2,189	166	243	3.0	36.1	36.1	36.1	0.0
G	3,235	23	72	10.1	41.1	41.1	41.1	0.0
H	3,770	63	194	3.8	43.9	43.9	44.1	0.2
I	4,290	30	114	6.5	47.2	47.2	47.2	0.0
J	4,775	43	117	6.3	52.4	52.4	52.4	0.0
K	5,120	69	187	3.9	54.1	54.1	54.3	0.2
L	5,500	65	155	4.8	56.4	56.4	56.6	0.2
M	5,573	68	199	3.7	57.3	57.3	57.4	0.1
N	5,945	126	377	2.0	58.3	58.3	58.5	0.2

[1]Feet above confluence with Herring Brook

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ

(BERGEN CO.)

FLOODWAY DATA

BEHNKE BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						(FEET NGVD)		
Herring Brook								
A	15	54	157	5.5	31.7	29.8[2]	30.0	0.2
B	325	35	166	5.3	31.7	30.9[2]	31.1	0.2
C	890	37	184	1.9	31.9	31.9	32.1	0.2
D	1,340	31	124	2.8	32.0	32.0	32.2	0.2
E	1,840	30	88	3.9	32.8	32.8	33.0	0.2
F	2,645	25	86	4.0	33.9	33.9	34.1	0.2
G	2,920	37	102	3.4	35.3	35.3	35.4	0.1
H	3,440	31	98	3.5	36.2	36.2	36.2	0.0
I	4,170	24	67	5.2	37.8	37.8	37.8	0.0
J	4,350	19	47	7.4	38.5	38.5	38.5	0.0
K	4,720	17	55	6.2	40.5	40.5	40.5	0.0
L	5,650	50	287	1.2	53.0	53.0	53.0	0.0
M	5,775	45	260	1.3	53.0	53.0	53.0	0.0

[1]Feet above confluence with Van Saun Mill Brook

[2]Elevation computed without consideration of backwater effects from Van Saun Mill Brook

TABLE 2

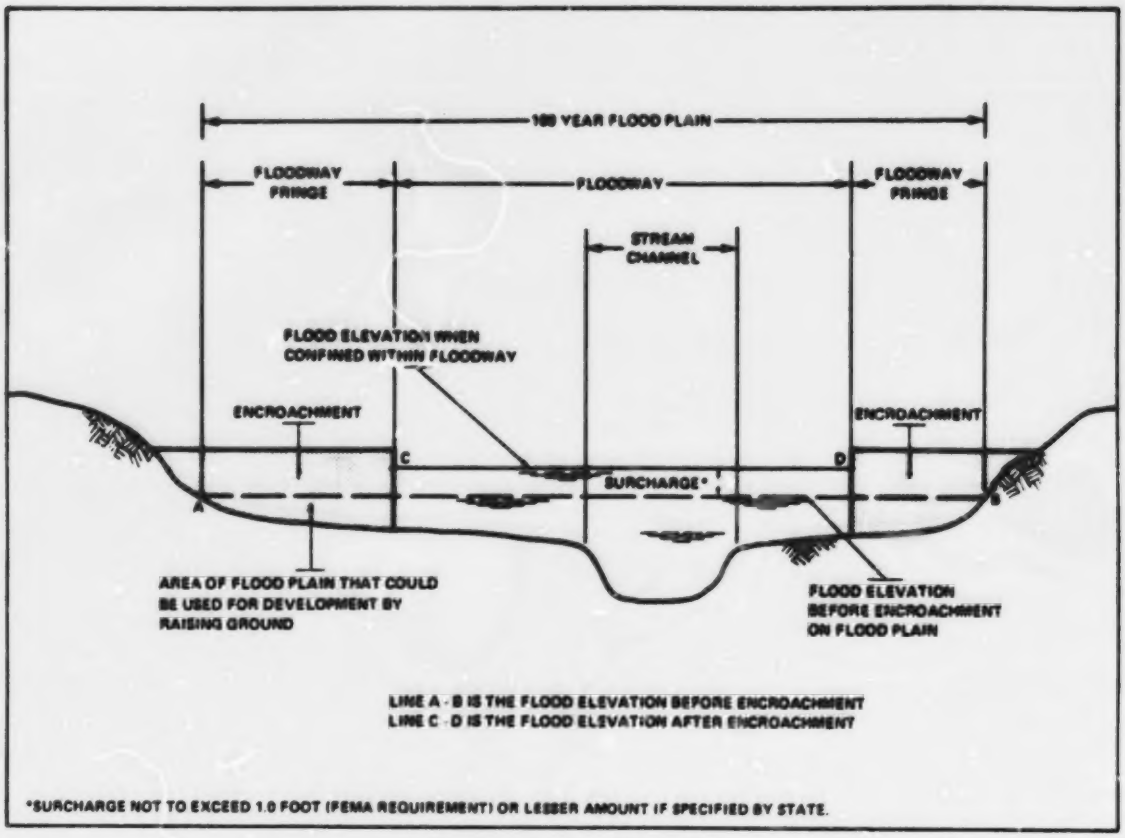
FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ

(BERGEN CO.)

FLOODWAY DATA

HERRING BROOK


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC Figure 2

5.1 Reach Determinations

Reaches are defined as sections of floodplain that have relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following tabulation for more than 20 percent of the reach:

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the Borough of Paramus are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 3).

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations rounded to the nearest one-half foot, multiplied by 10, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF, and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zone AO:	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; depths are shown but no FHFs are determined.
Zones A2, A3, A4, A6, A10, A11, and A15	Special Flood Hazard Areas inundated by the 100-year flood, with base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- or 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the community are shown in Table 3.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Borough of Paramus is, for insurance purposes, the principal result of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevations. Base flood elevation lines show the locations of the expected whole-foot water-surface elevation of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

Flood Insurance Studies for the Townships of Rochelle Park and Washington, the Boroughs of Oradell, Maywood, Fair Lawn, Glen Rock, and River Edge, the Village of Ridgewood, and the City of Hackensack have been completed (References 10, 13, 14, 15, 16, 17, 18, 19, and 11). The results of this study are in complete agreement with those studies except those for Rochelle Park, Ridgewood, and Fair Lawn.

The Flood Insurance Studies for the Township of Rochelle Park and the Village of Ridgewood do not reflect the effects of this revision along the Saddle River and therefore the results of this study do not agree with those studies.

The hydrology used in this study reflects a more up-to-date method than the hydrology used in the Flood Insurance Study for the Borough of Fair Lawn, therefore the results of this study do not agree with that study.

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, 26 Federal Plaza, Room 1351, New York, New York 10278.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Behnke Brook							
Reach 1	03	-1.0	-0.3	+0.6	010	A2	Varies
Reach 2	03	-2.0	-0.8	+1.7	020	A4	Varies
Reach 3	03	-1.2	-0.4	+0.7	010	A2	Varies
Reach 4	03	-2.1	-0.6	+1.1	020	A4	Varies
Reach 5	02,03	-1.1	-0.4	+1.1	010	A2	Varies
Herring Brook							
Reach 1	03	-2.0	-0.6	+1.2	020	A4	Varies
Reach 2	03	-1.5	-0.5	+1.1	015	A3	Varies
Reach 3	03	-7.5	-0.2	+0.2	075	A15	Varies
Culvert under Korvettes Parking Lot	03	Shallow Flooding - Average Depth 2 Feet				AO	--

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ

(BERGEN CO.)

FLOOD INSURANCE ZONE DATA

BEHNKE BROOK AND HERRING BROOK

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Saddle River Backwater Affecting							
Sprout Brook	03	-5.5	-2.2	+4.4	055	A11	42
Reach 1	02,03	-5.0	-1.9	+3.7	050	A10	Varies
Reach 2	01,02	-2.9	-1.0	+3.0	030	A6	Varies
Sprout Brook							
Reach 1	02,03	-2.1	-0.6	+1.6	020	A4	Varies
Mannings Brook							
Reach 1	02	-1.0	-0.3	+0.8	010	A2	Varies
Van Saun Mill Brook							
Reach 1	03	-2.1	-0.6	+1.8	020	A4	Varies
Coles Brook							
Reach 1	03	-1.2	-0.4	+0.8	010	A2	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ

(BERGEN CO.)

FLOOD INSURANCE ZONE DATA

SADDLE RIVER, SPROUT BROOK, MANNINGS BROOK, VAN SAUN MILL BROOK AND COLES BROOK

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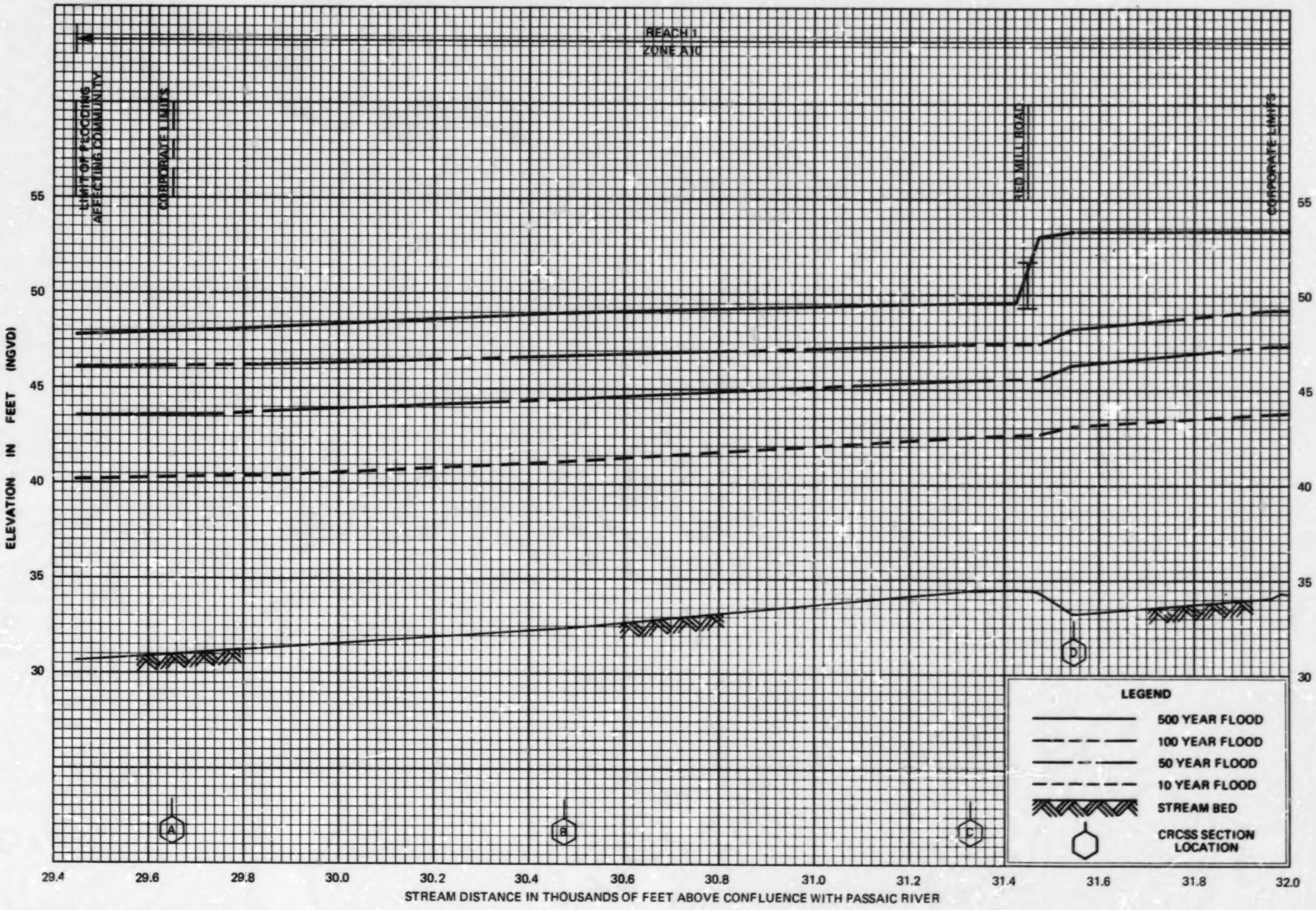

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

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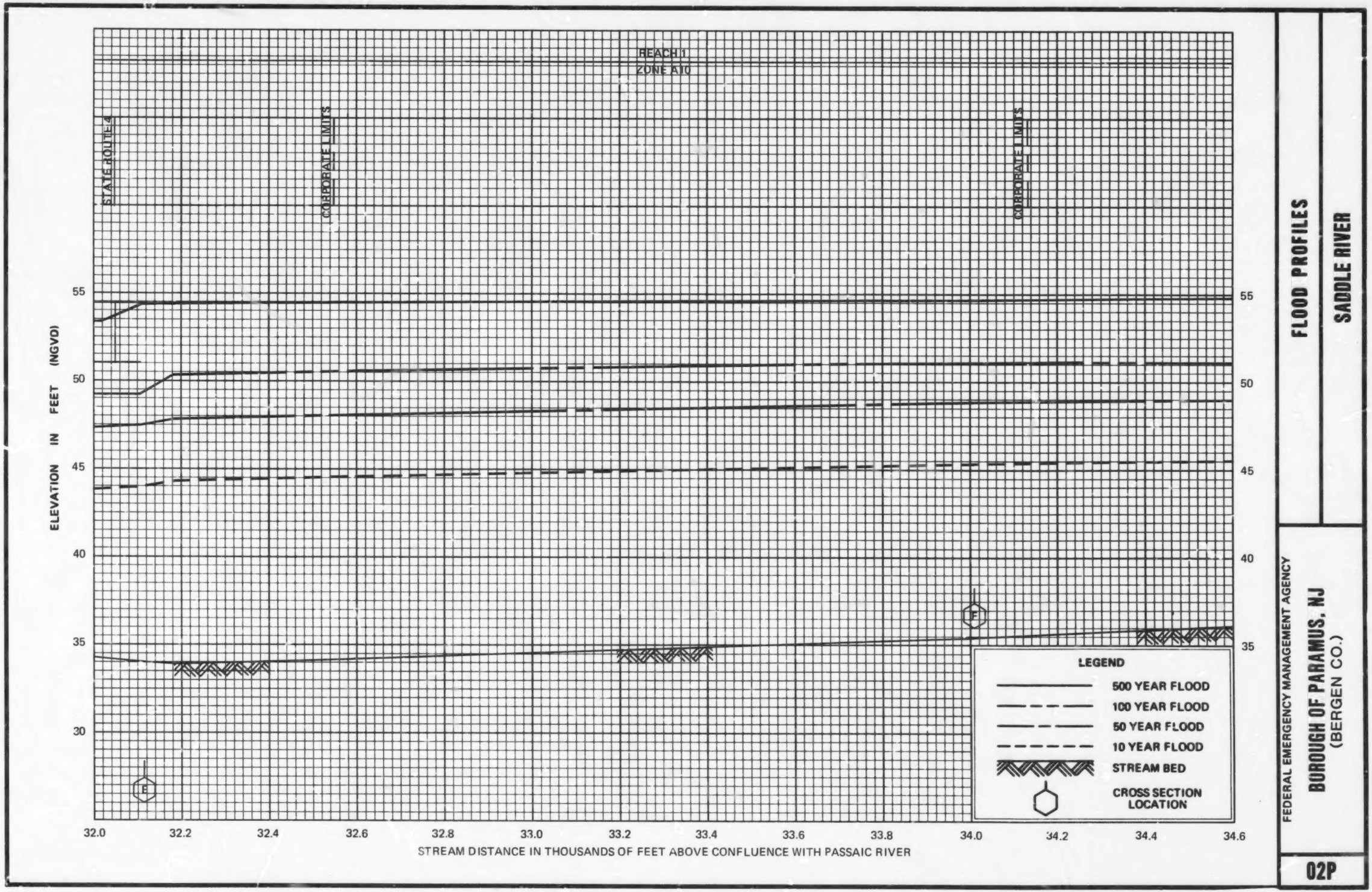

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

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REACH 1
ZONE AIQ

CORPORATE LIMITS

CORPORATE LIMITS

ELEVATION IN FEET (NGVD)

55
50
45
40
35

34.6 34.8 35.0 35.2 35.4 35.6 35.8 36.0 36.2 36.4 36.6 36.8 37.0 37.2

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONFLUENCE WITH PASSAIC RIVER

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

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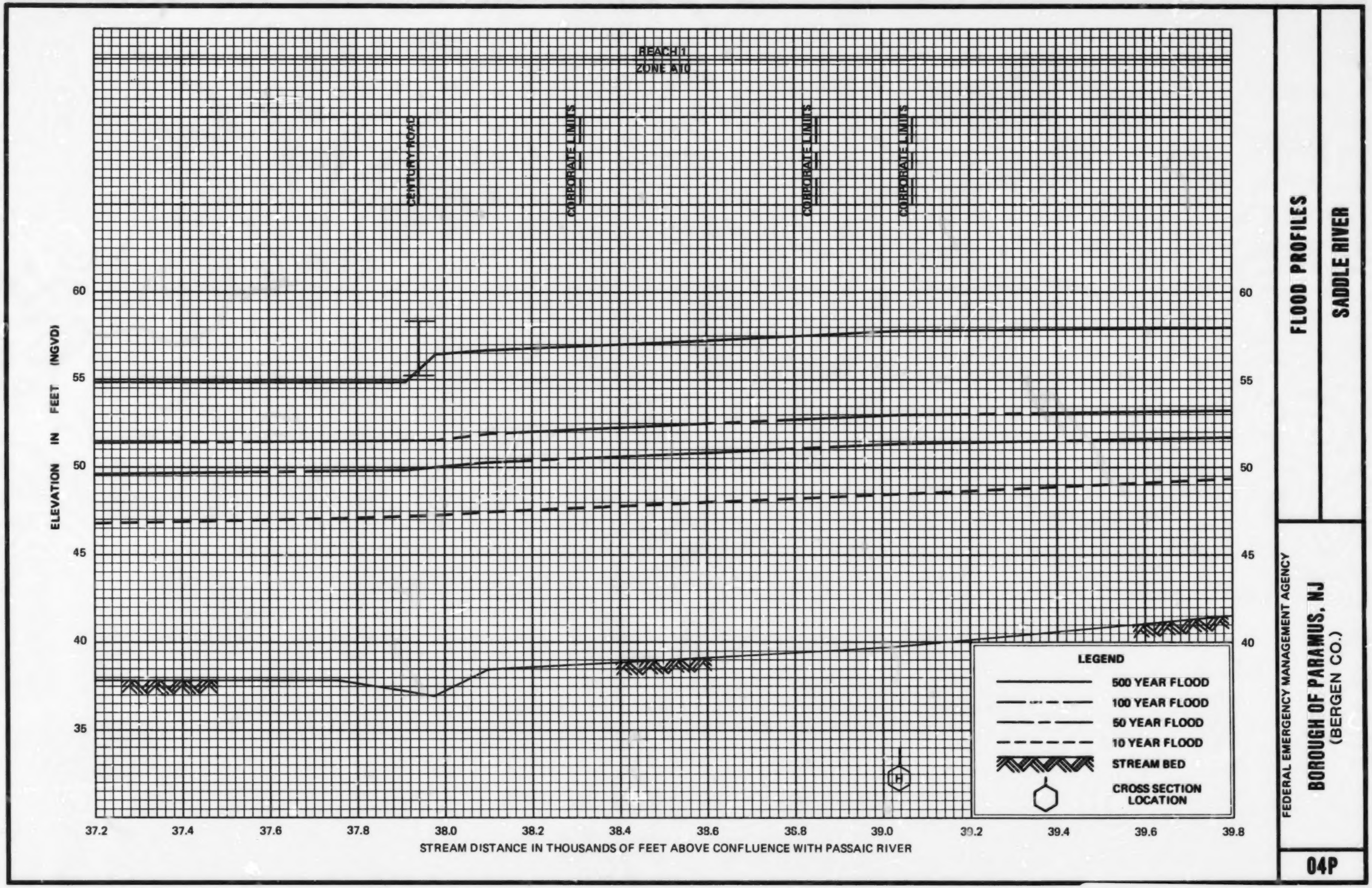

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

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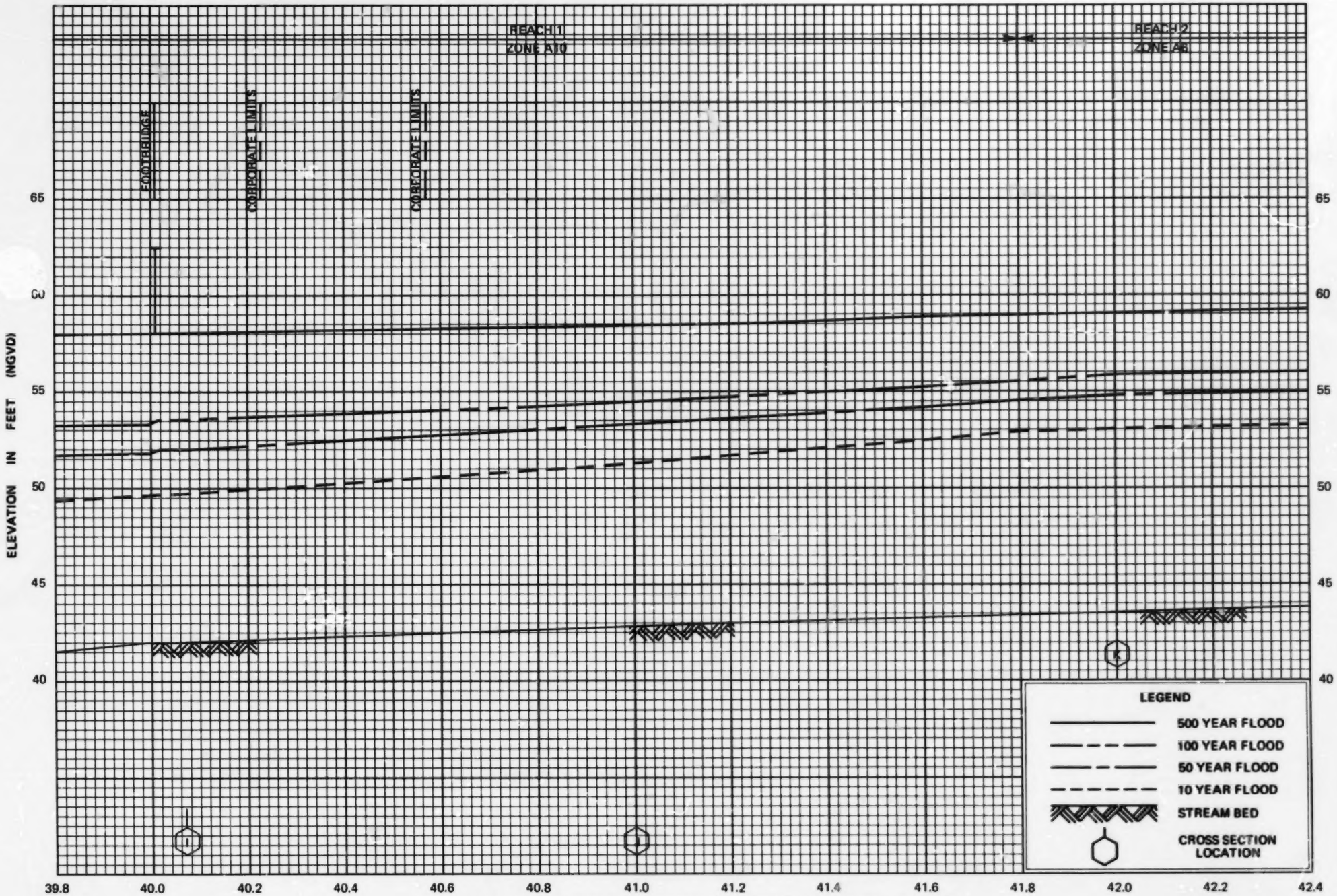

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

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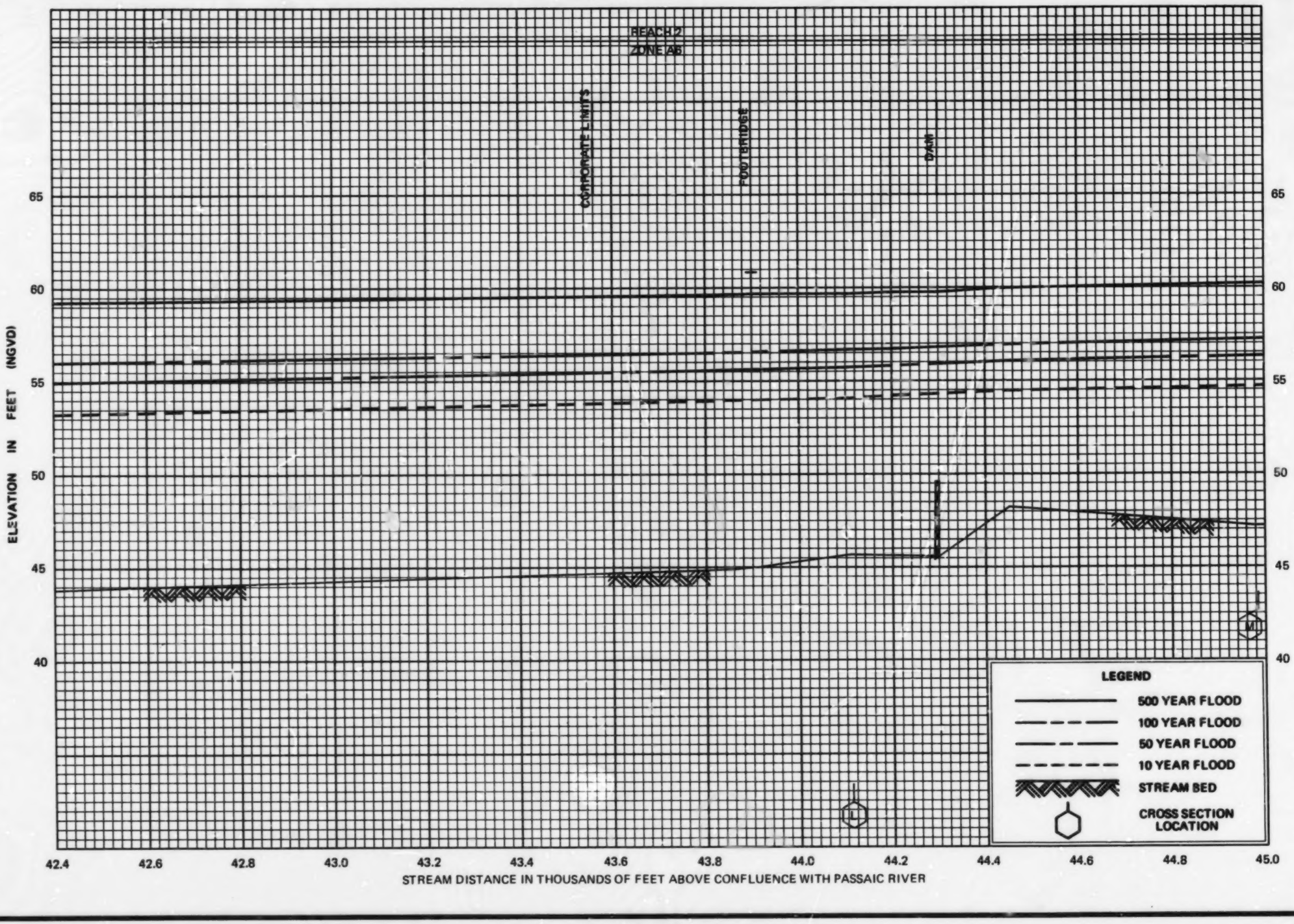

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

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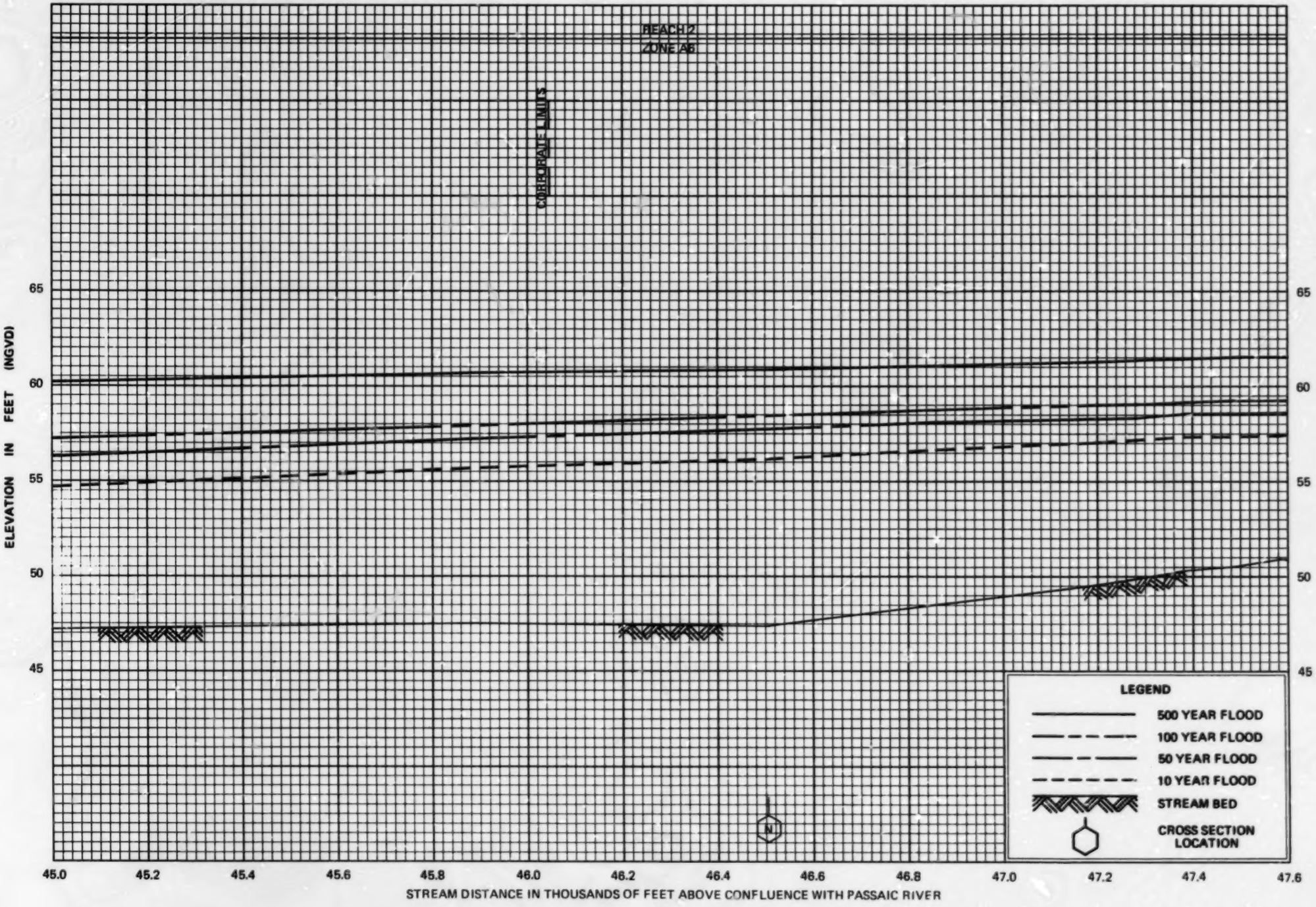

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

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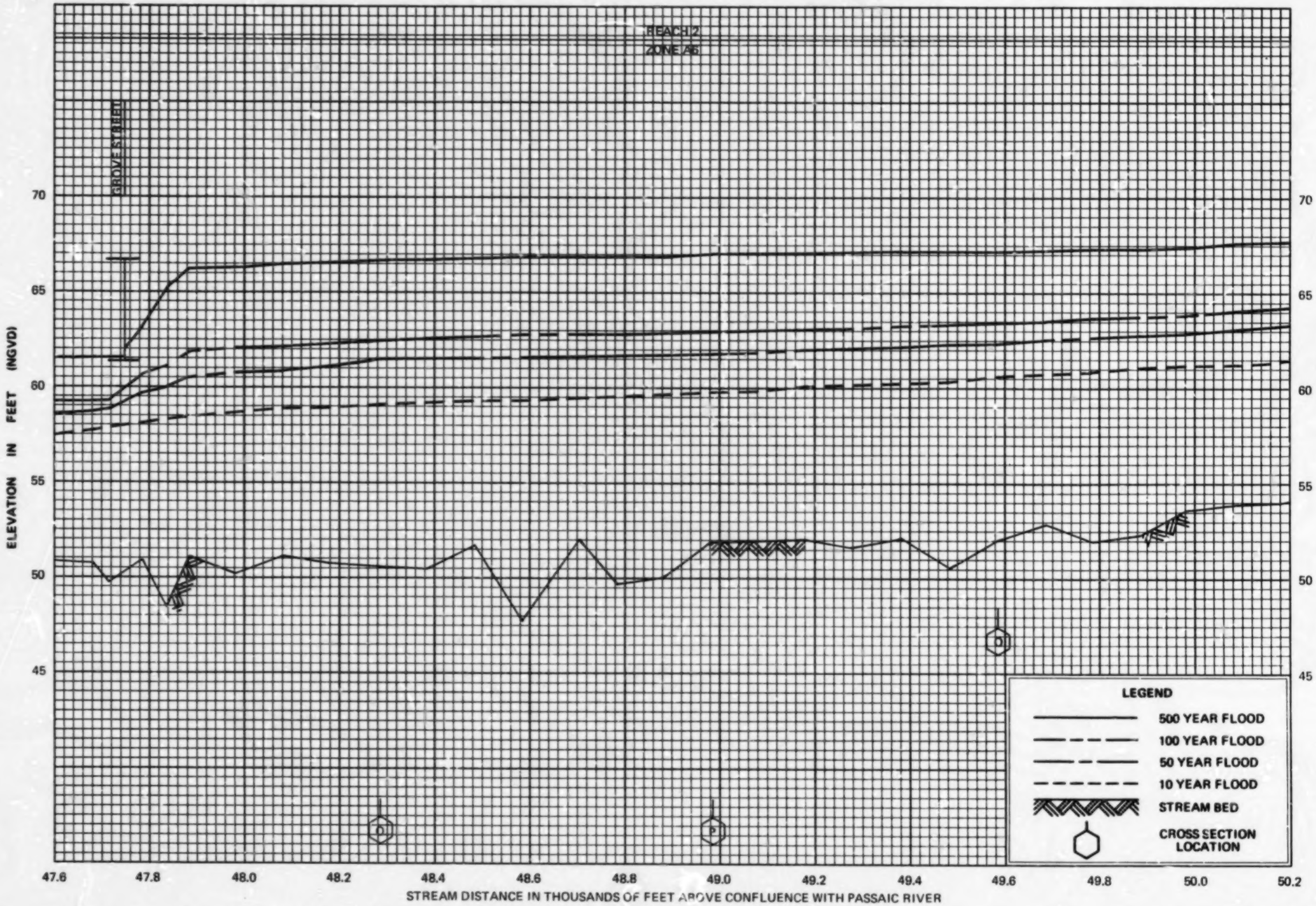

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

09P

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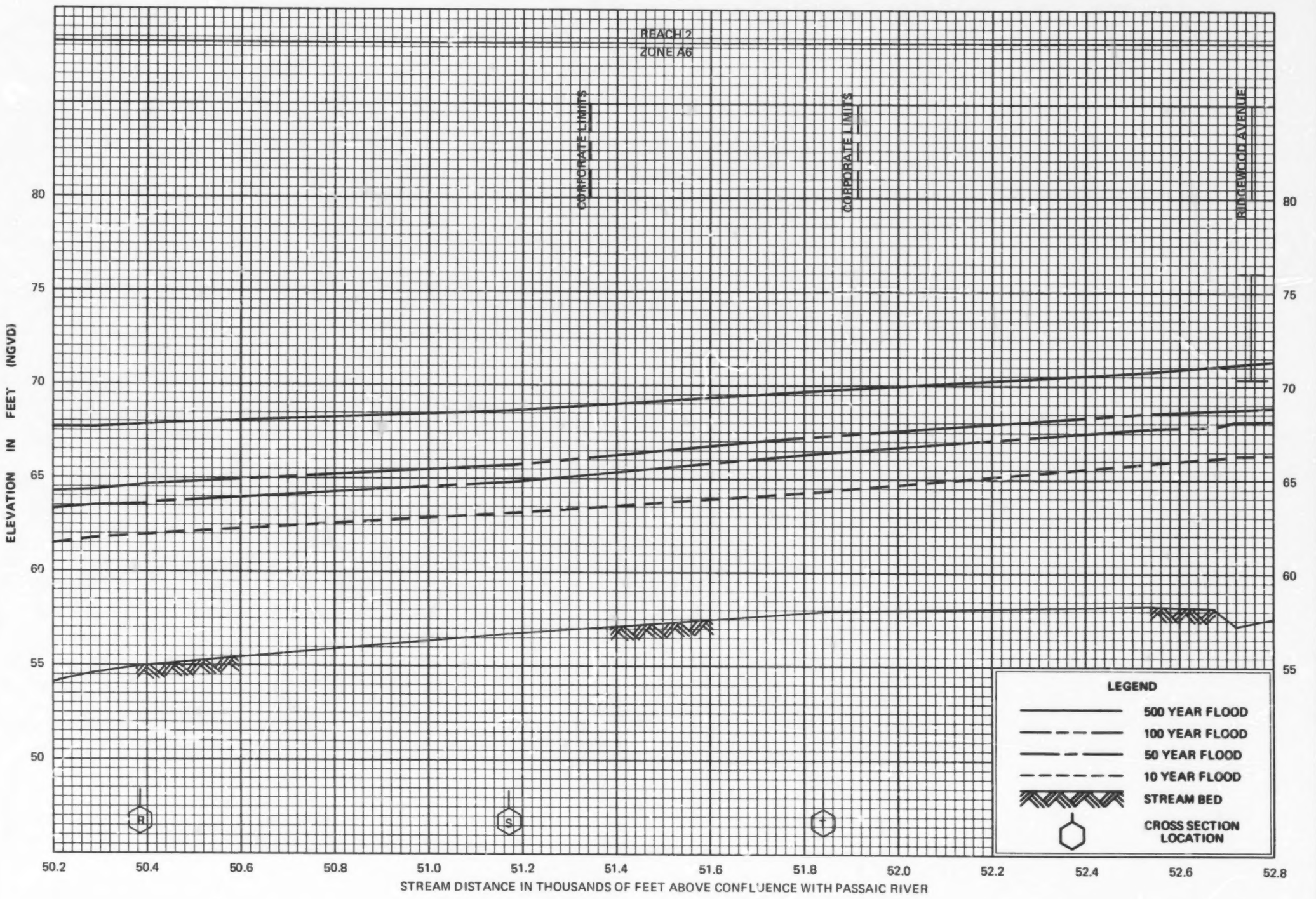

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

09P

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REACH 2
ZONE A6

60 INFRAFE LIMITS

ELEVATION IN FEET (NGVD)

80
75
70
65
60
55

52.8 53.0 53.2 53.4 53.6 53.8 54.0 54.2 54.4 54.6 54.8 55.0 55.2 55.4

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONFLUENCE WITH PASSAIC RIVER

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

10P

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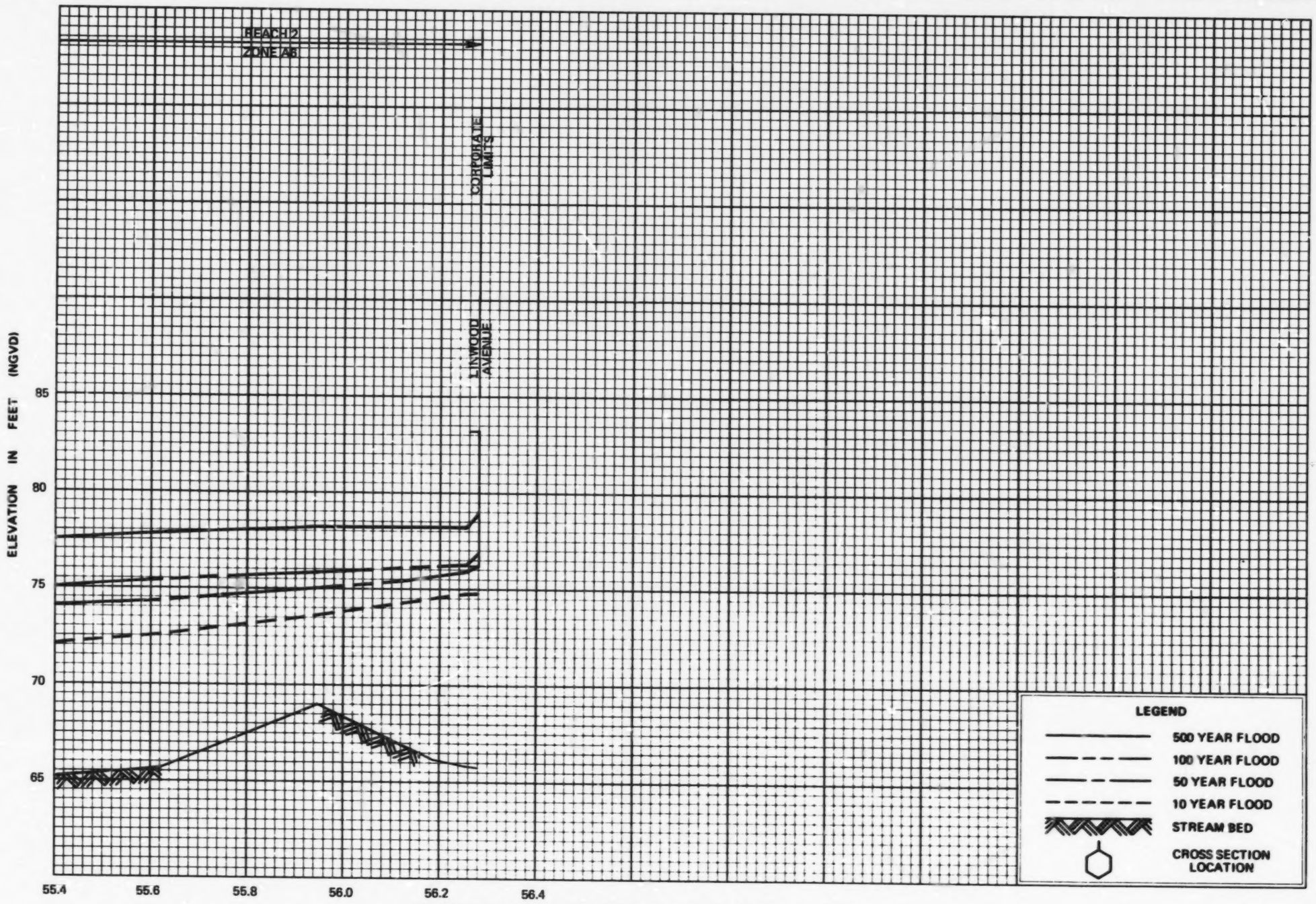

FLOOD PROFILES

SADDLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

11P

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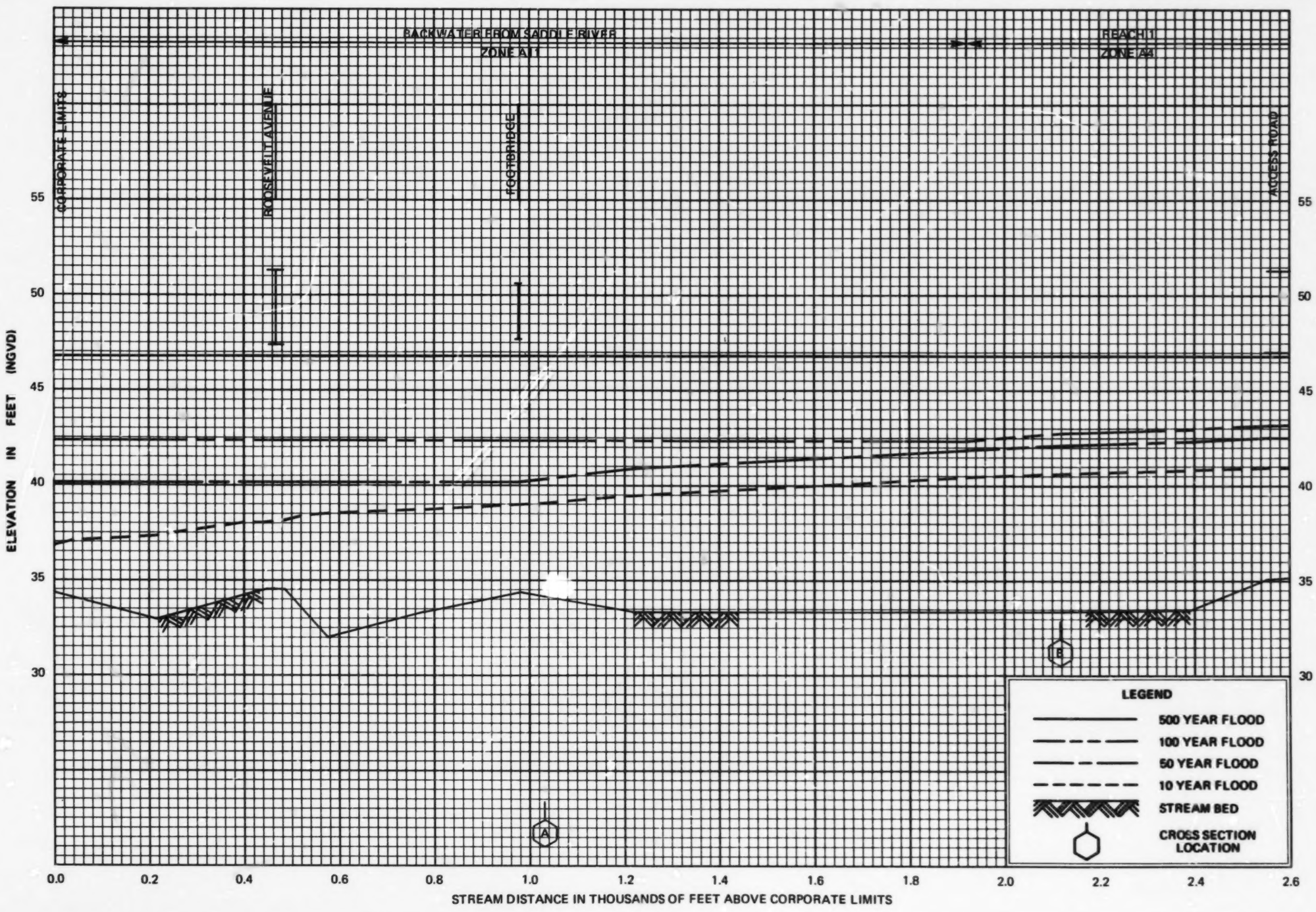

FLOOD PROFILES

SPROUT BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

12P

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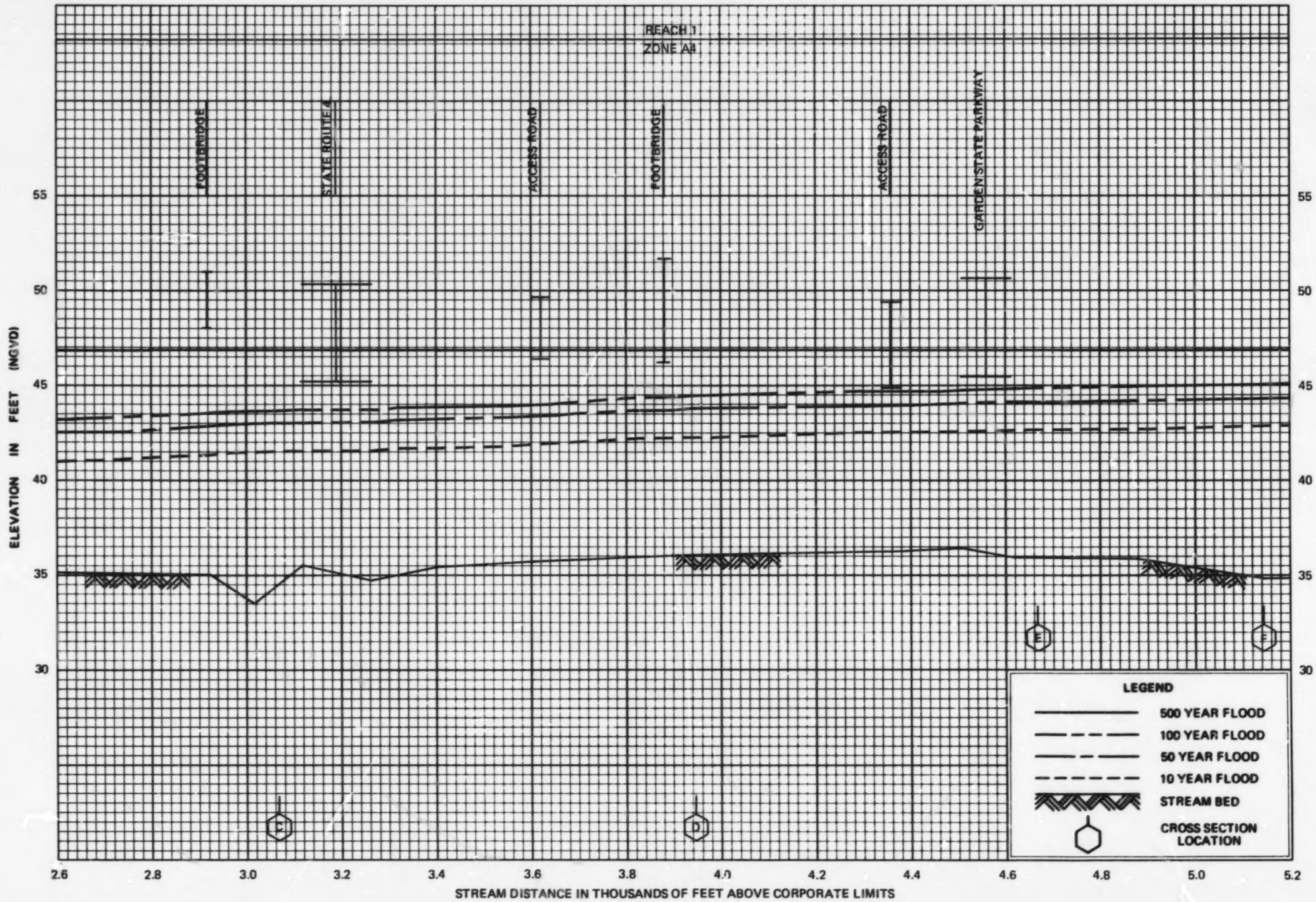

FLOOD PROFILES

SPROUT BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

13P

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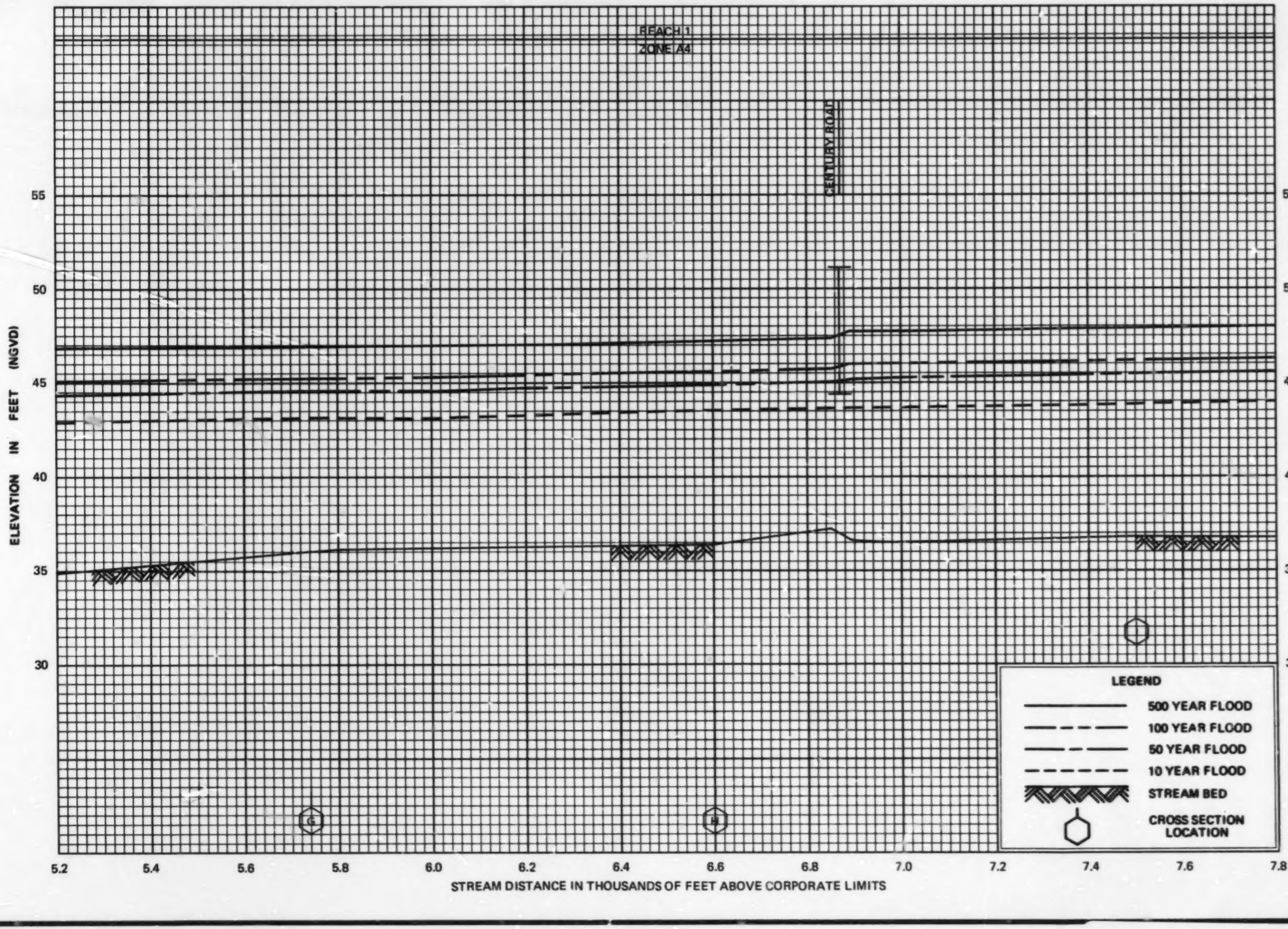

FLOOD PROFILES

SPROUT BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

14P

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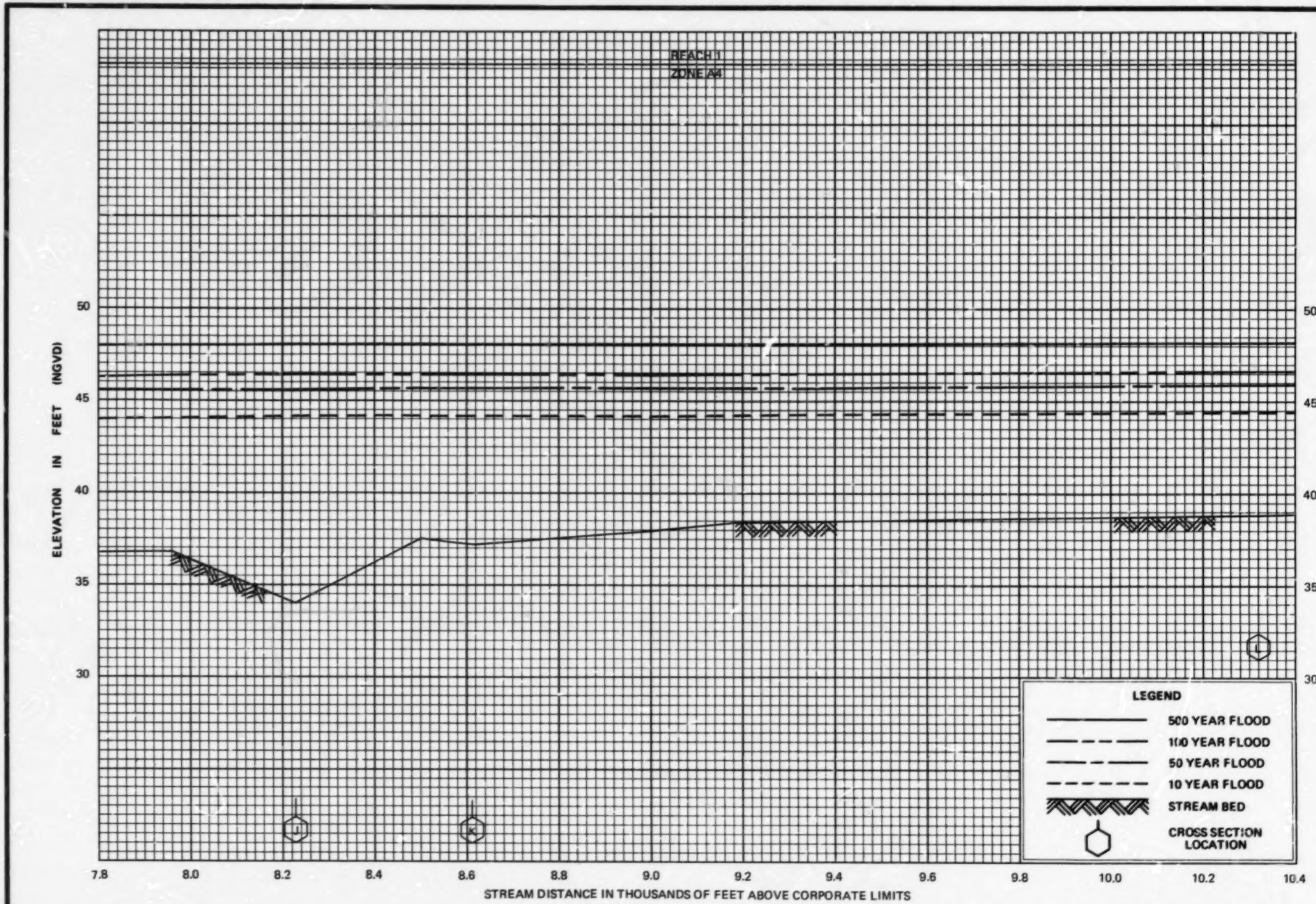

FLOOD PROFILES

SPROUT BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

15P

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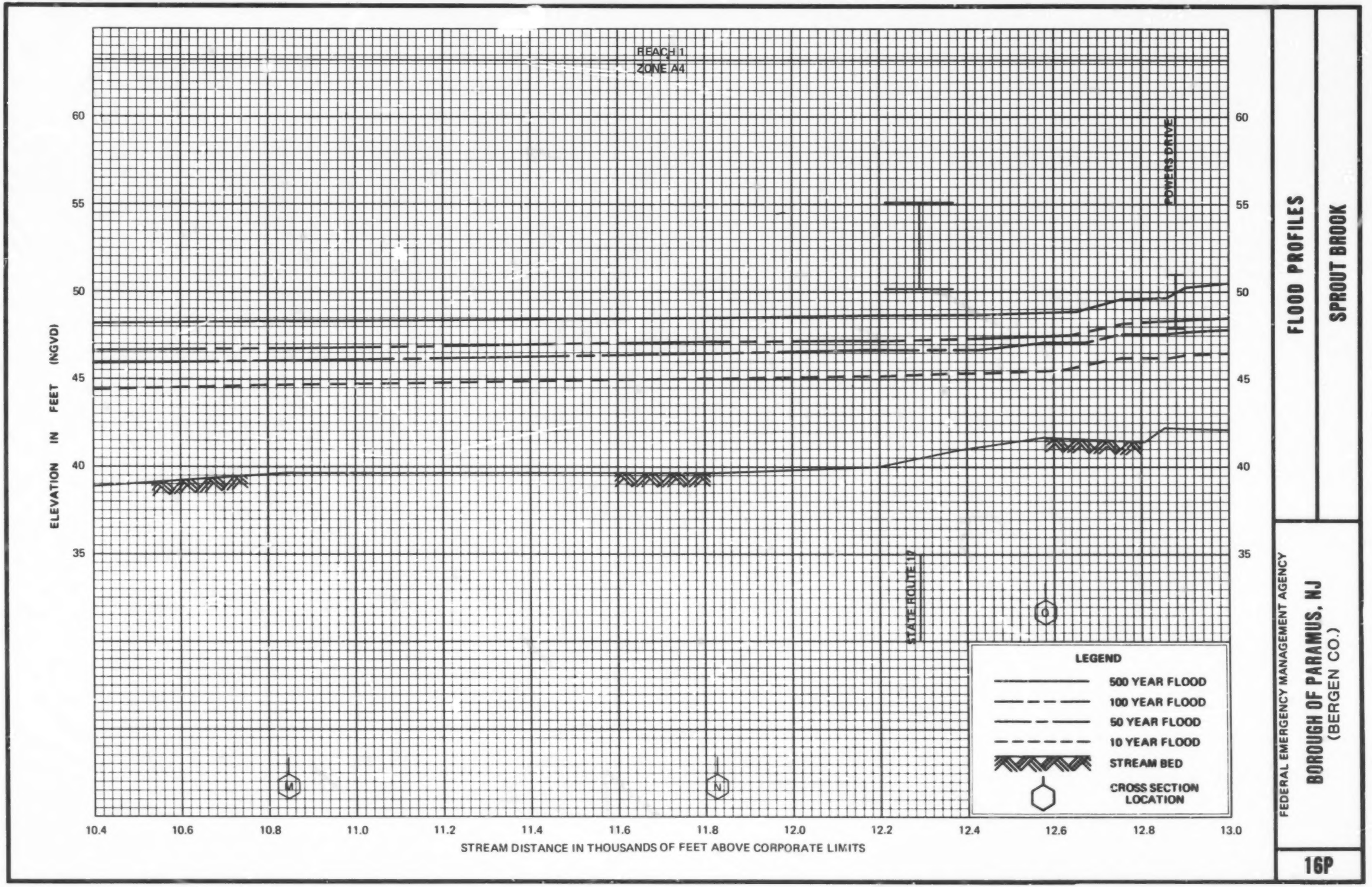

FLOOD PROFILES

SPROUT BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

16P

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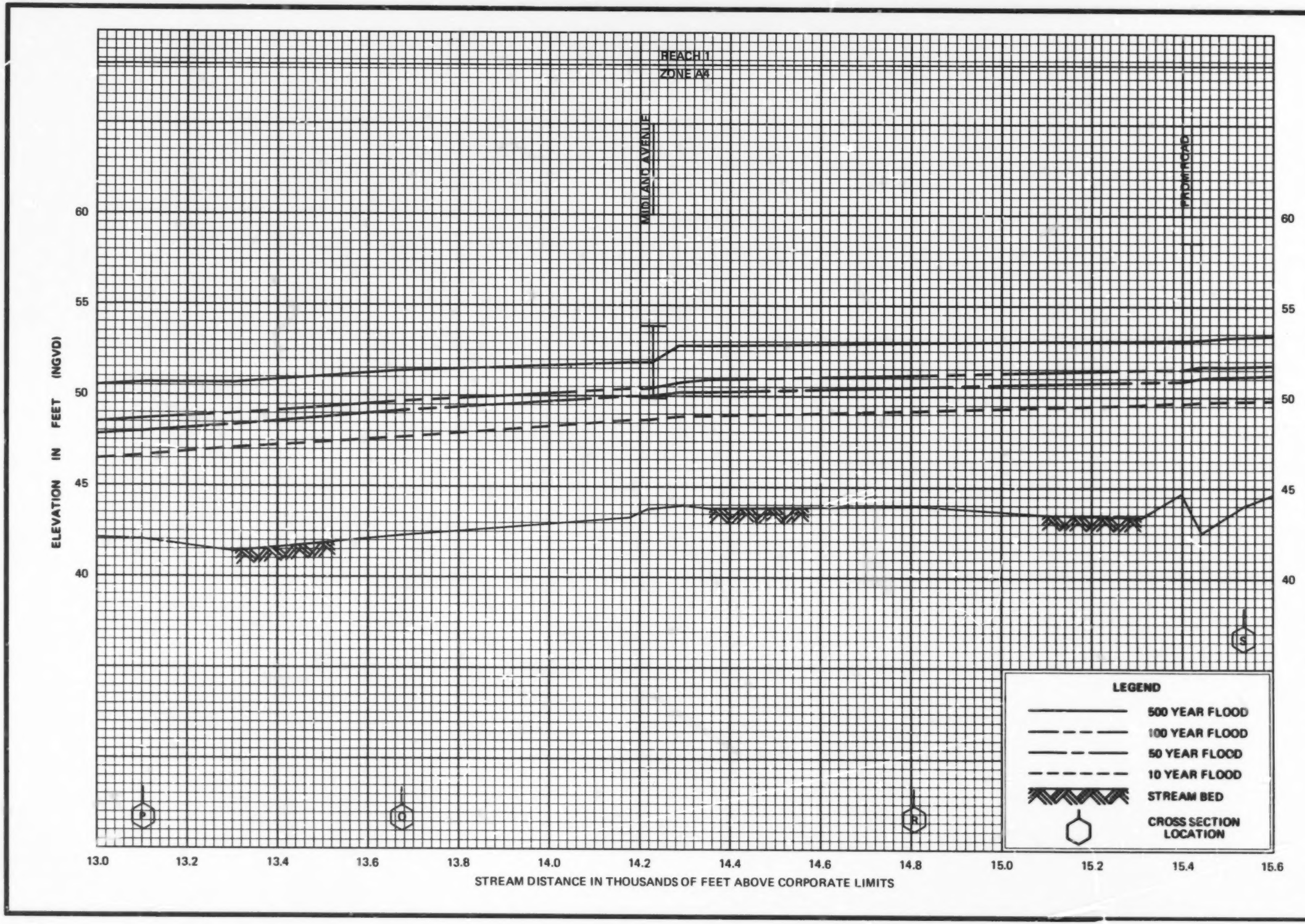

FLOOD PROFILES

SPROUT BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

17P

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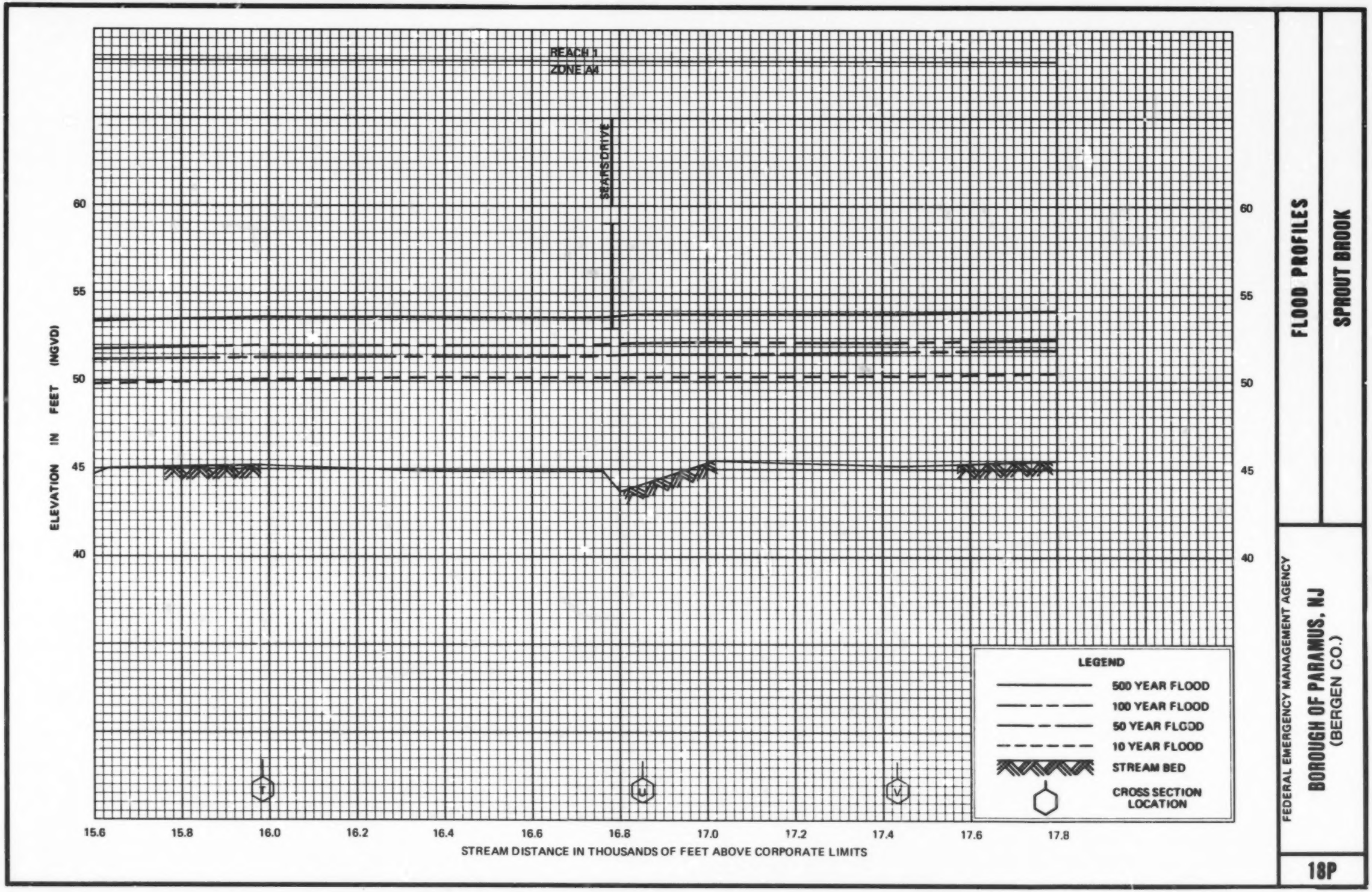

FLOOD PROFILES

SPROUT BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

18P

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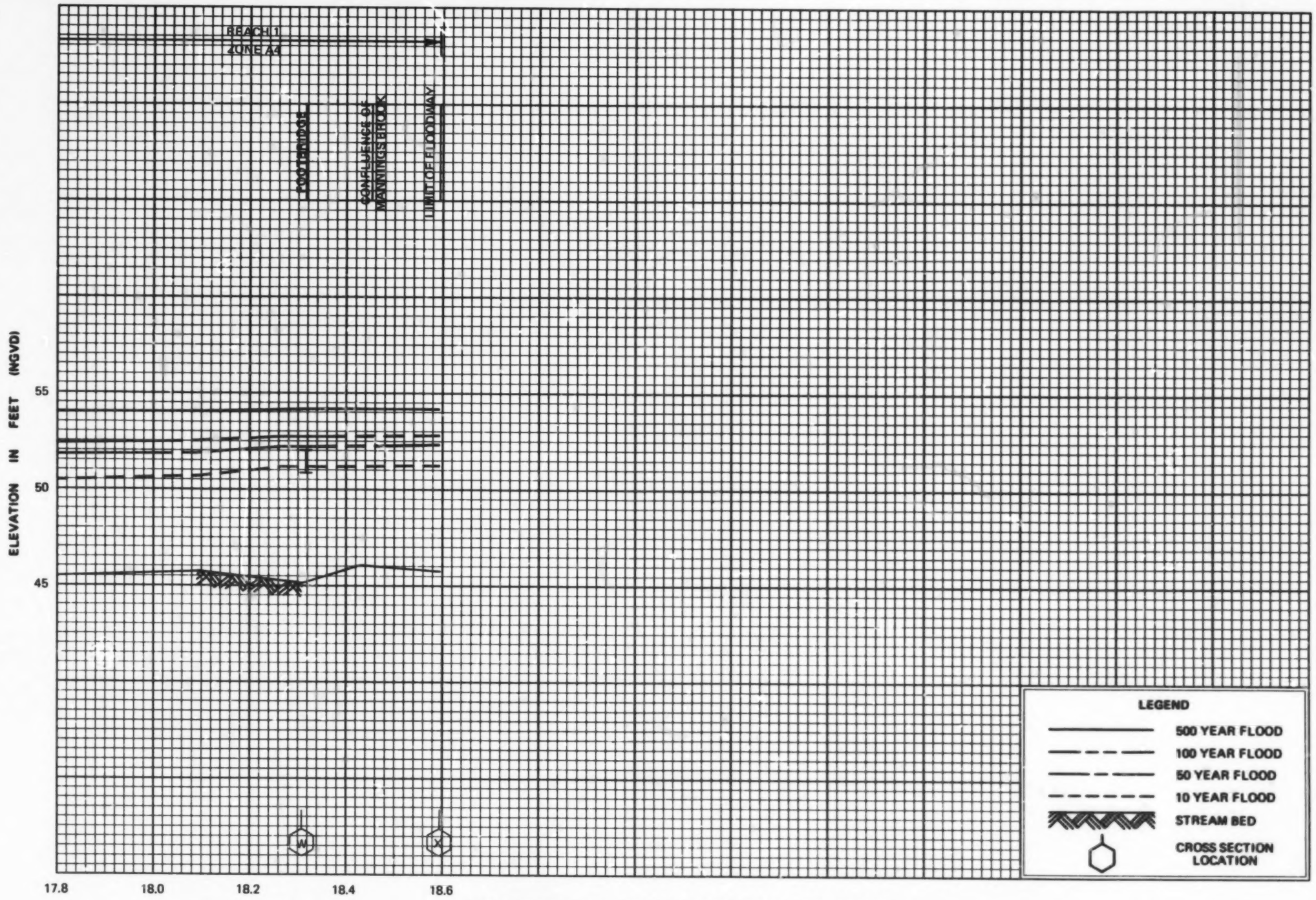

FLOOD PROFILES

SPROUT BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

19P

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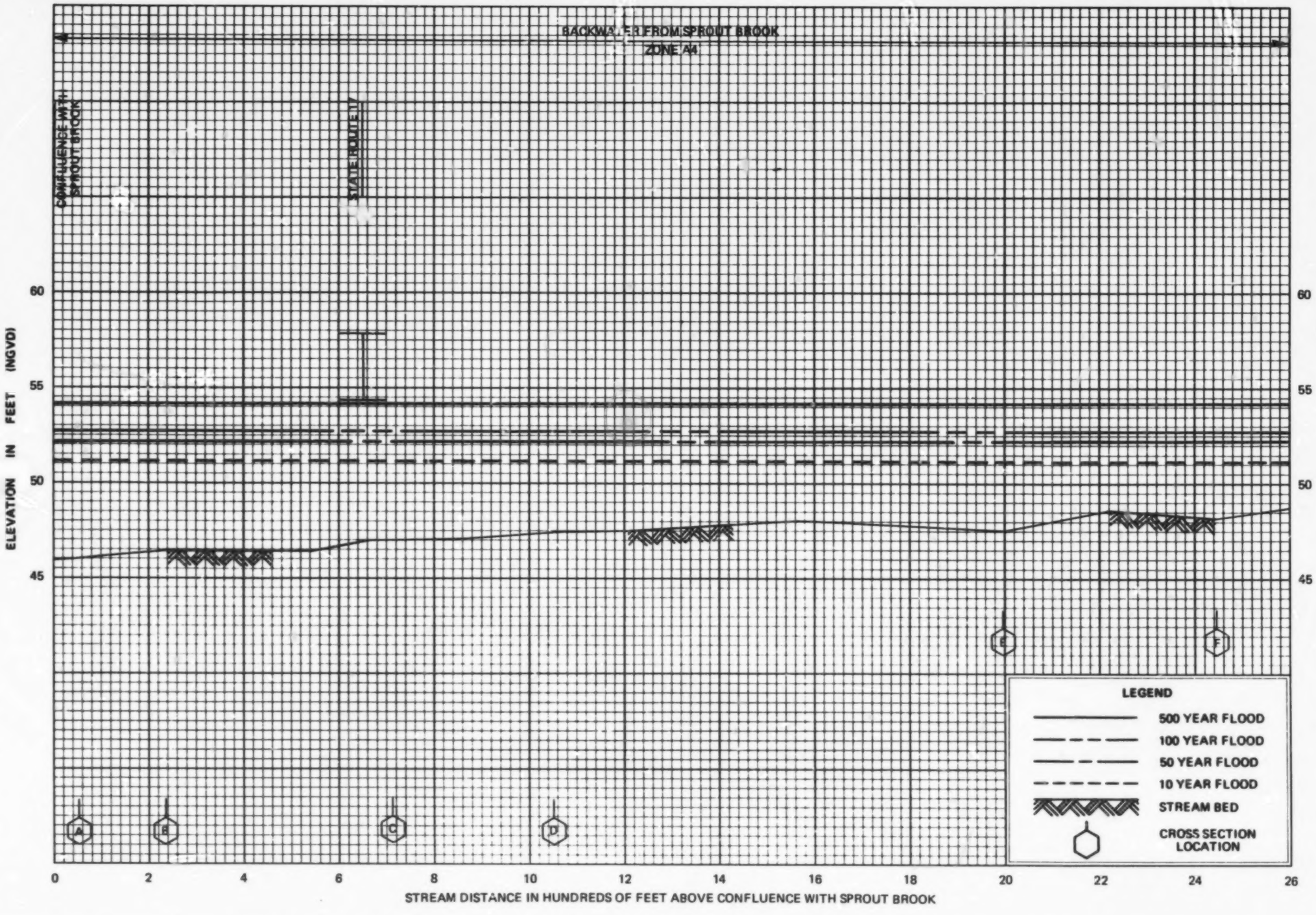

FLOOD PROFILES

MANNINGS BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

20P

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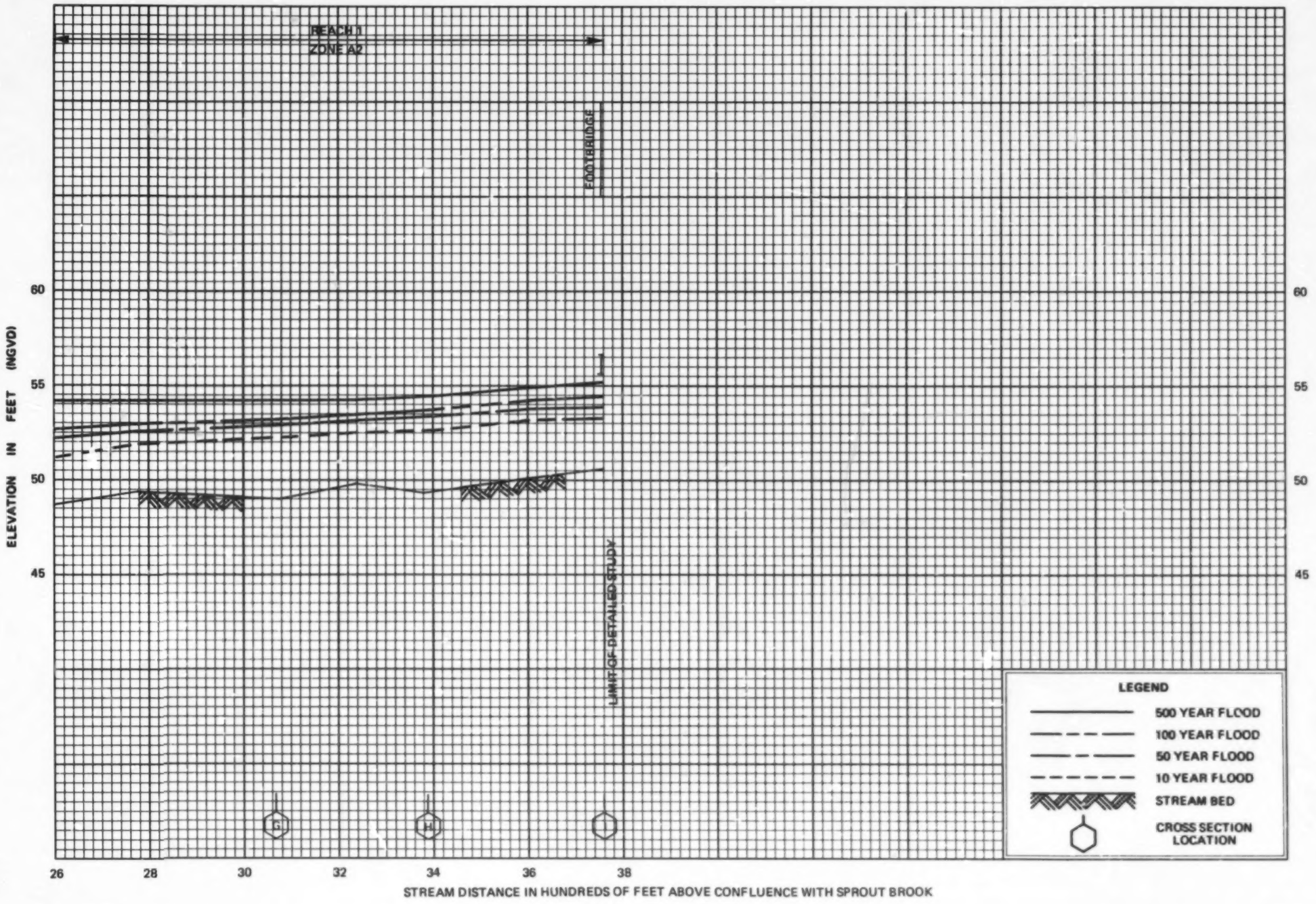

FLOOD PROFILES

MANNINGS BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

21P

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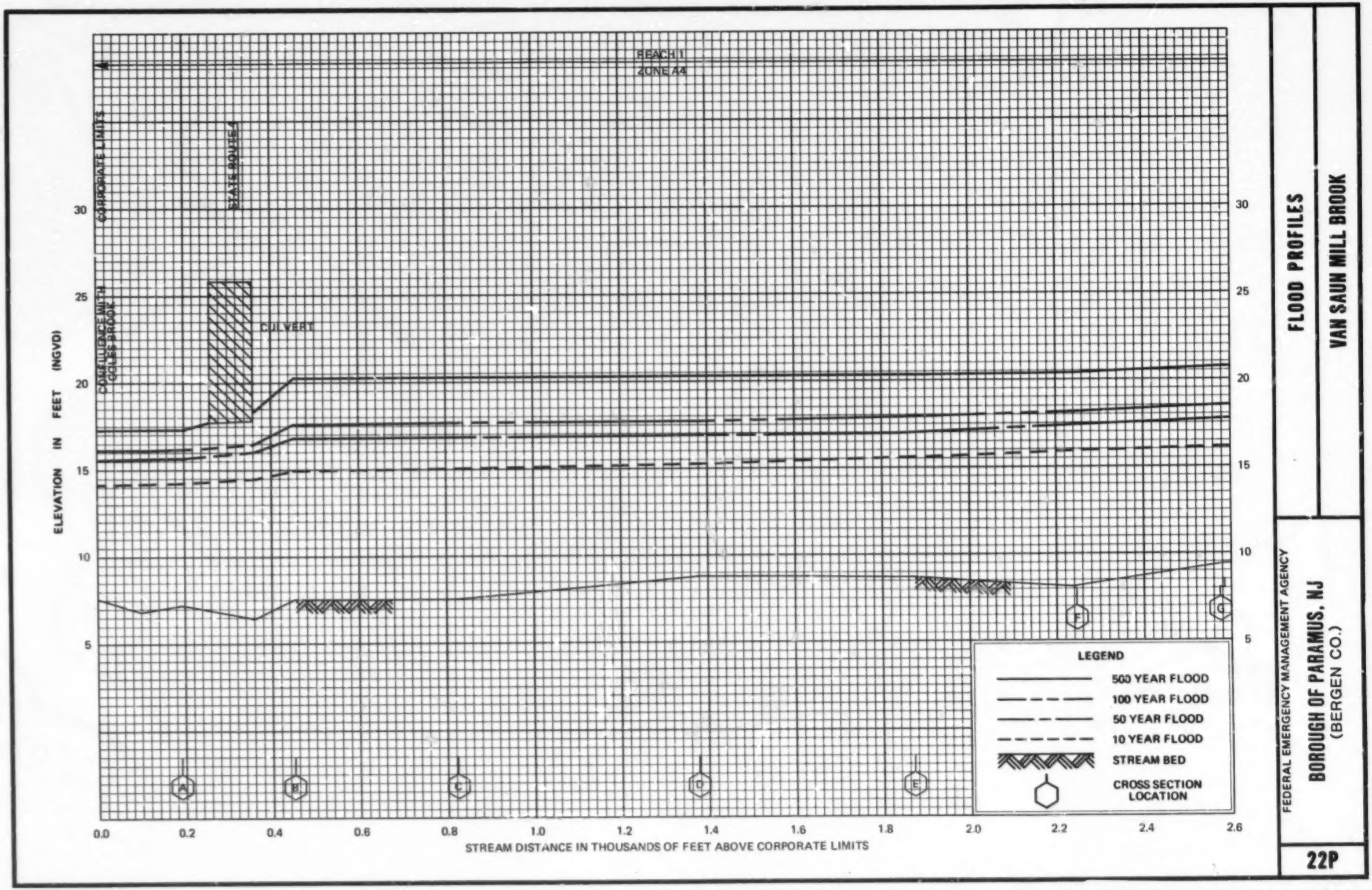

FLOOD PROFILES

VAN SAUN MILL BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

22P

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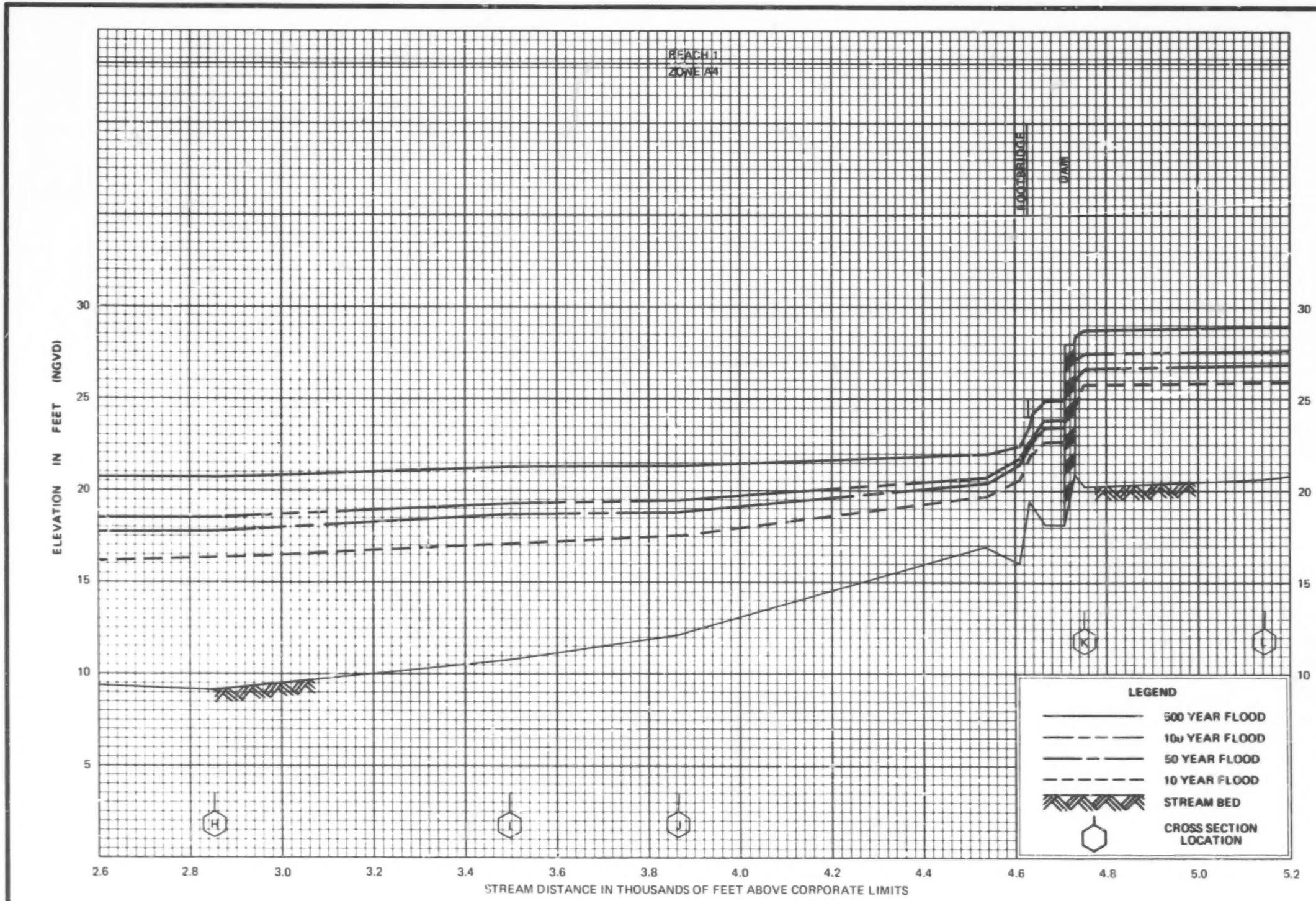

FLOOD PROFILES

VAN SAUN MILL BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

23P

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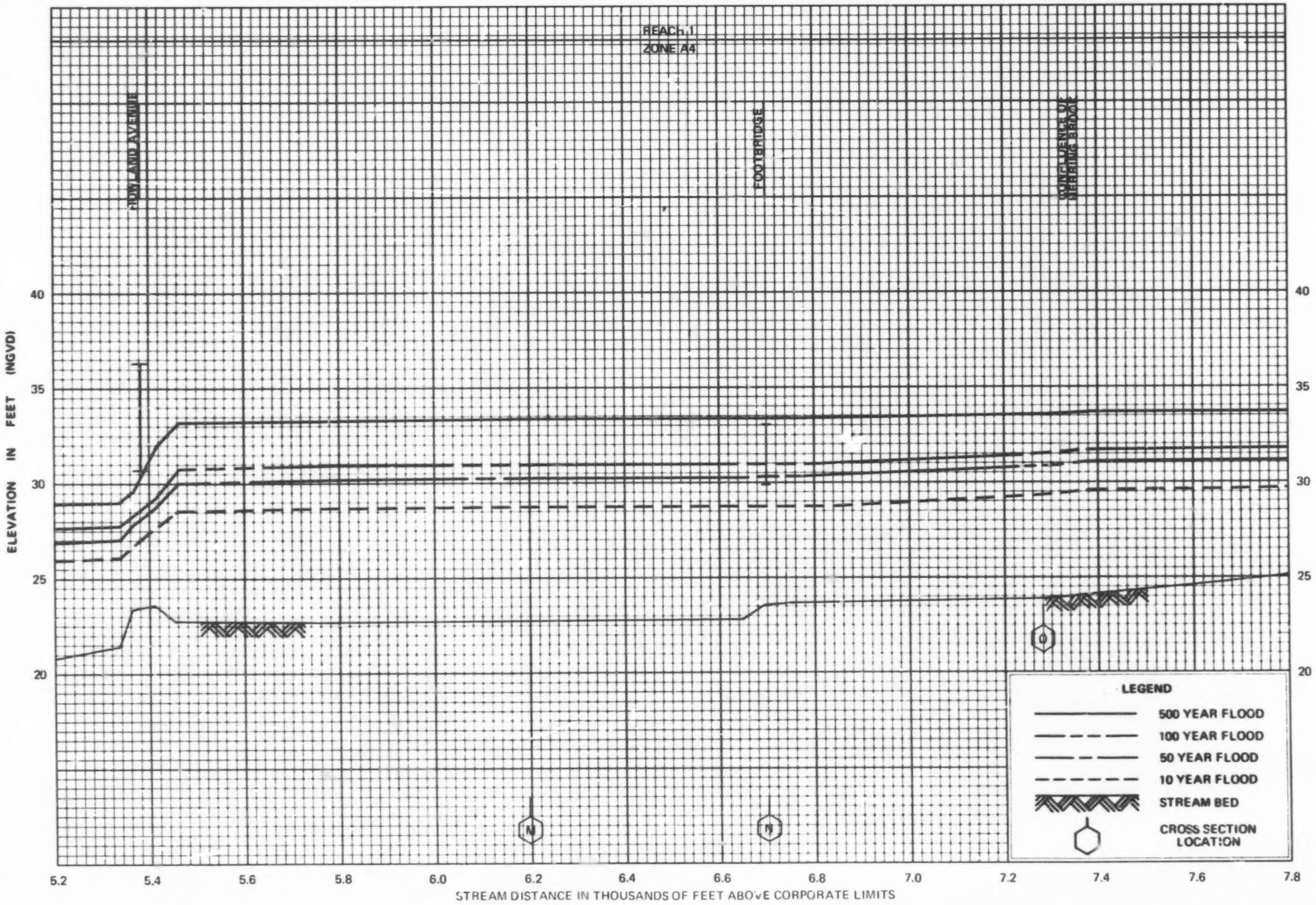

FLOOD PROFILES

VAN SAUN MILL BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

24P

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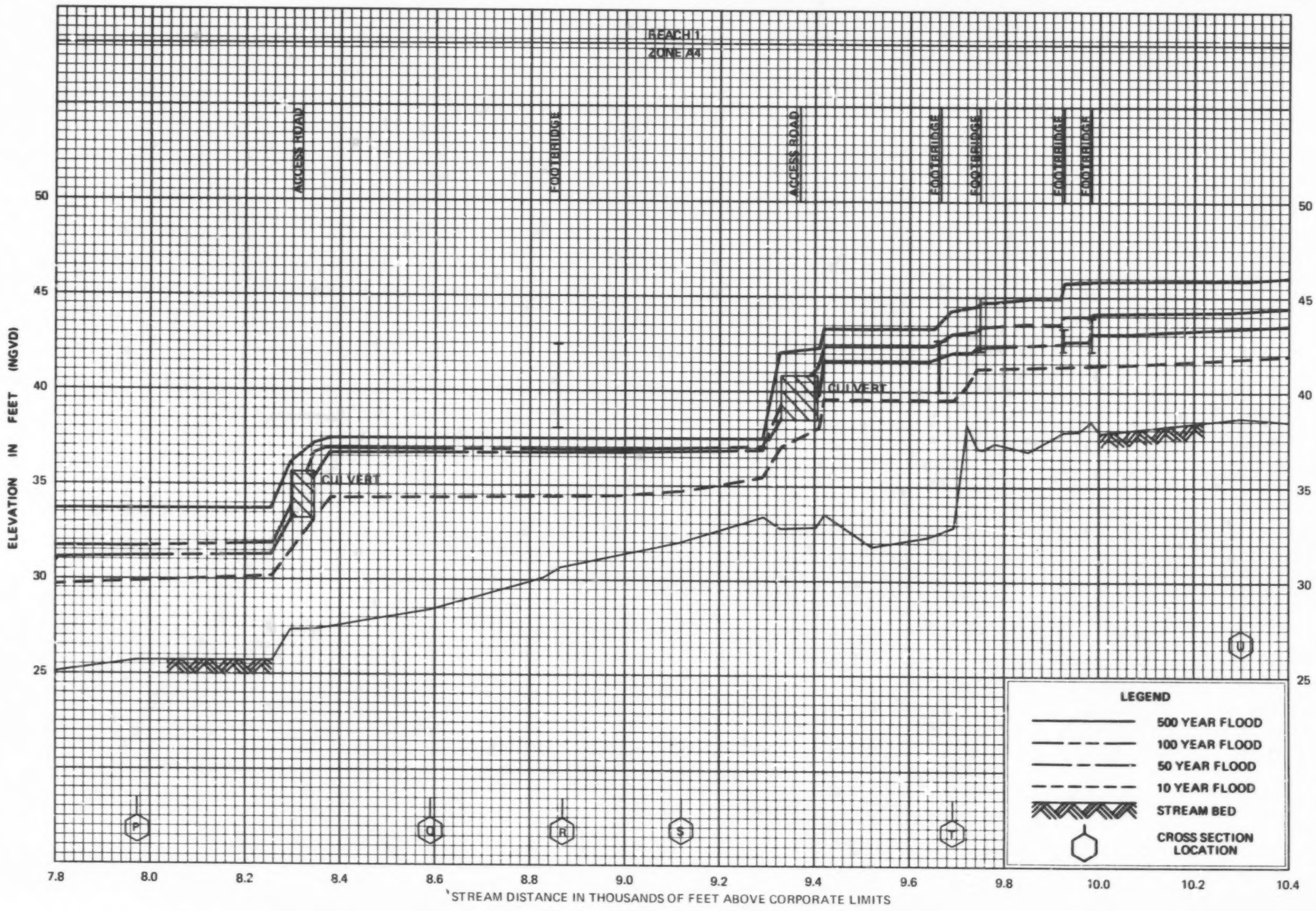

FLOOD PROFILES

VAN SAUN MILL BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

25P

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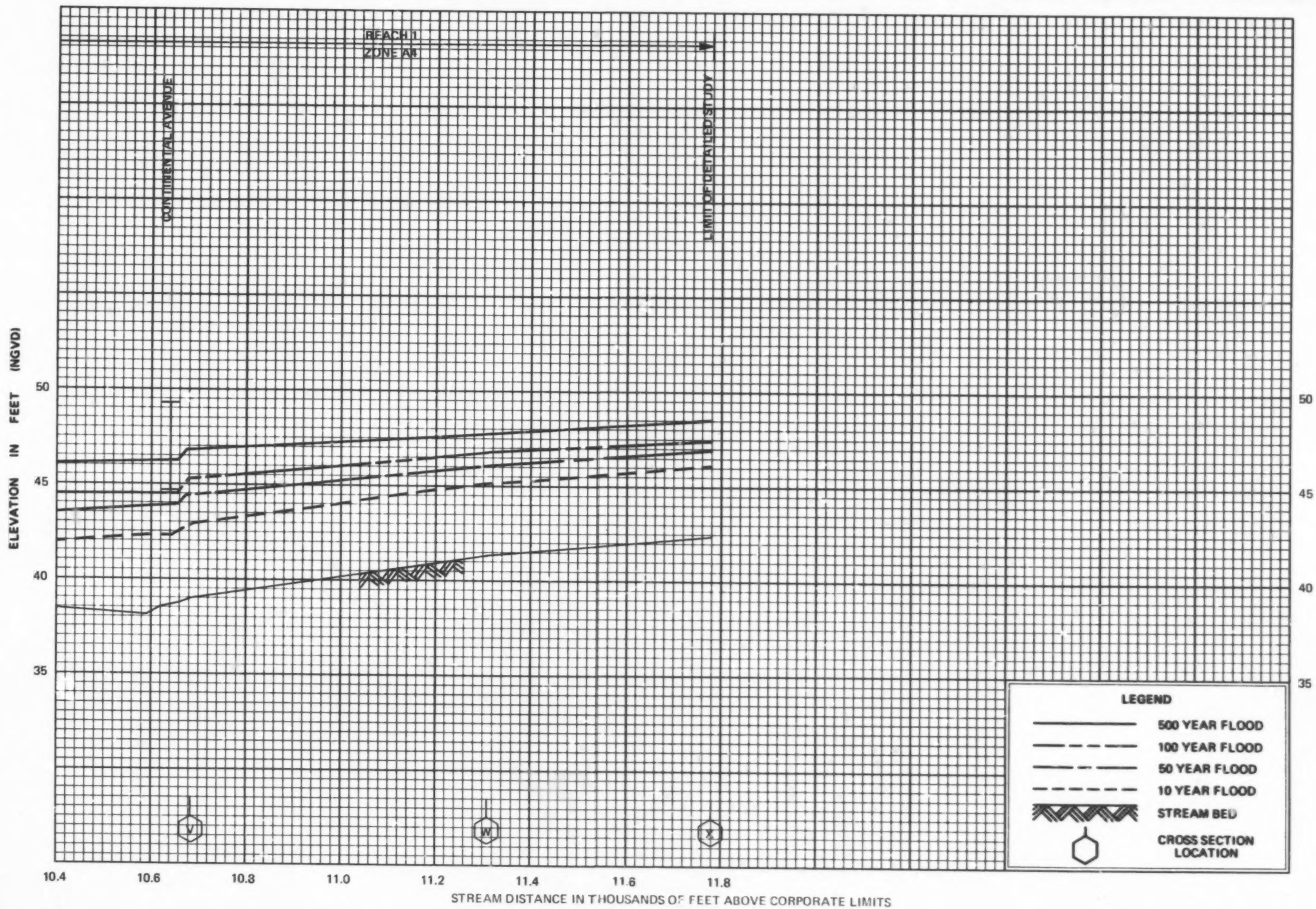

FLOOD PROFILES

VAN SAUN MILL BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

26P

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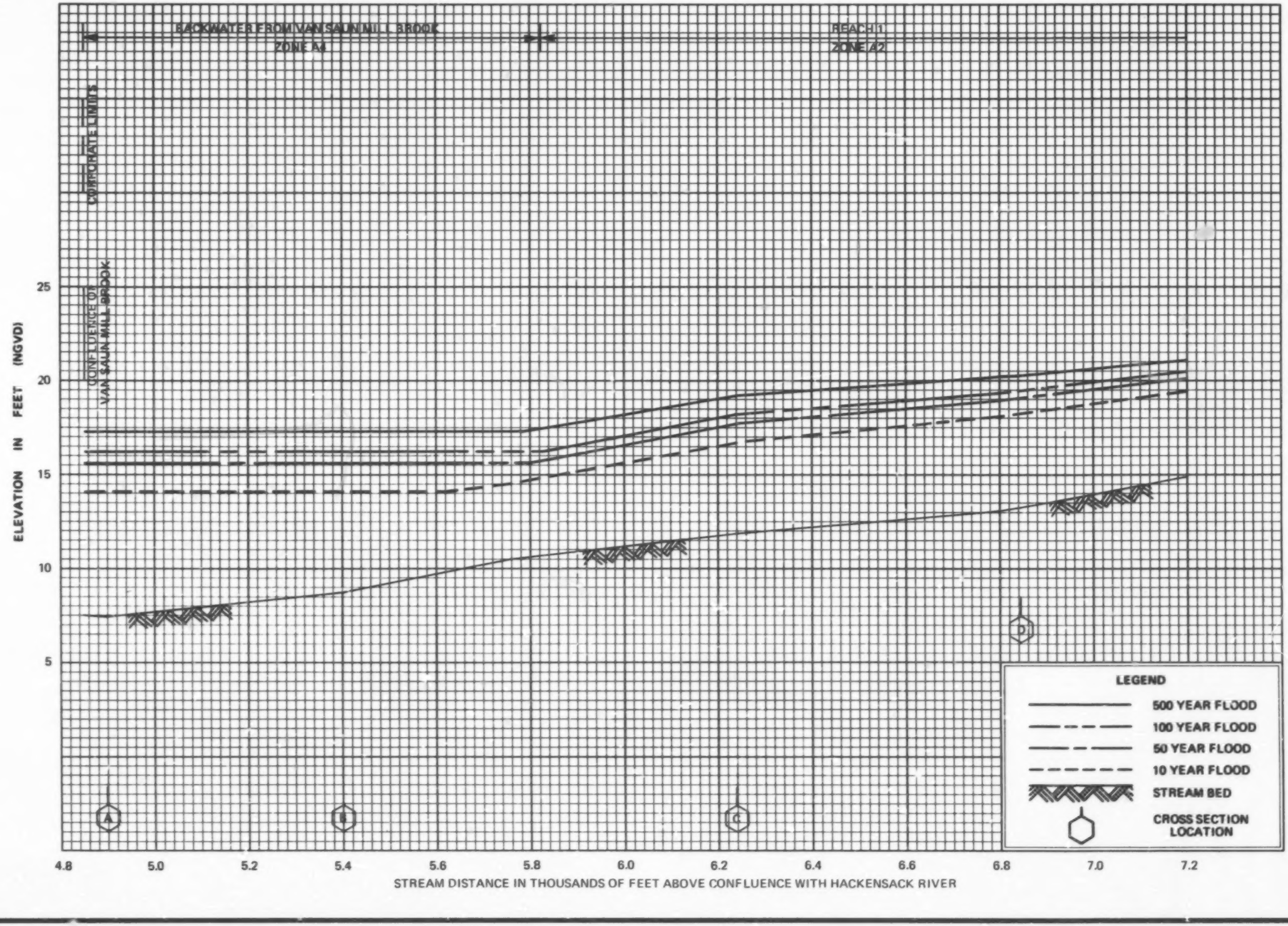

FLOOD PROFILES

COLES BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

27P

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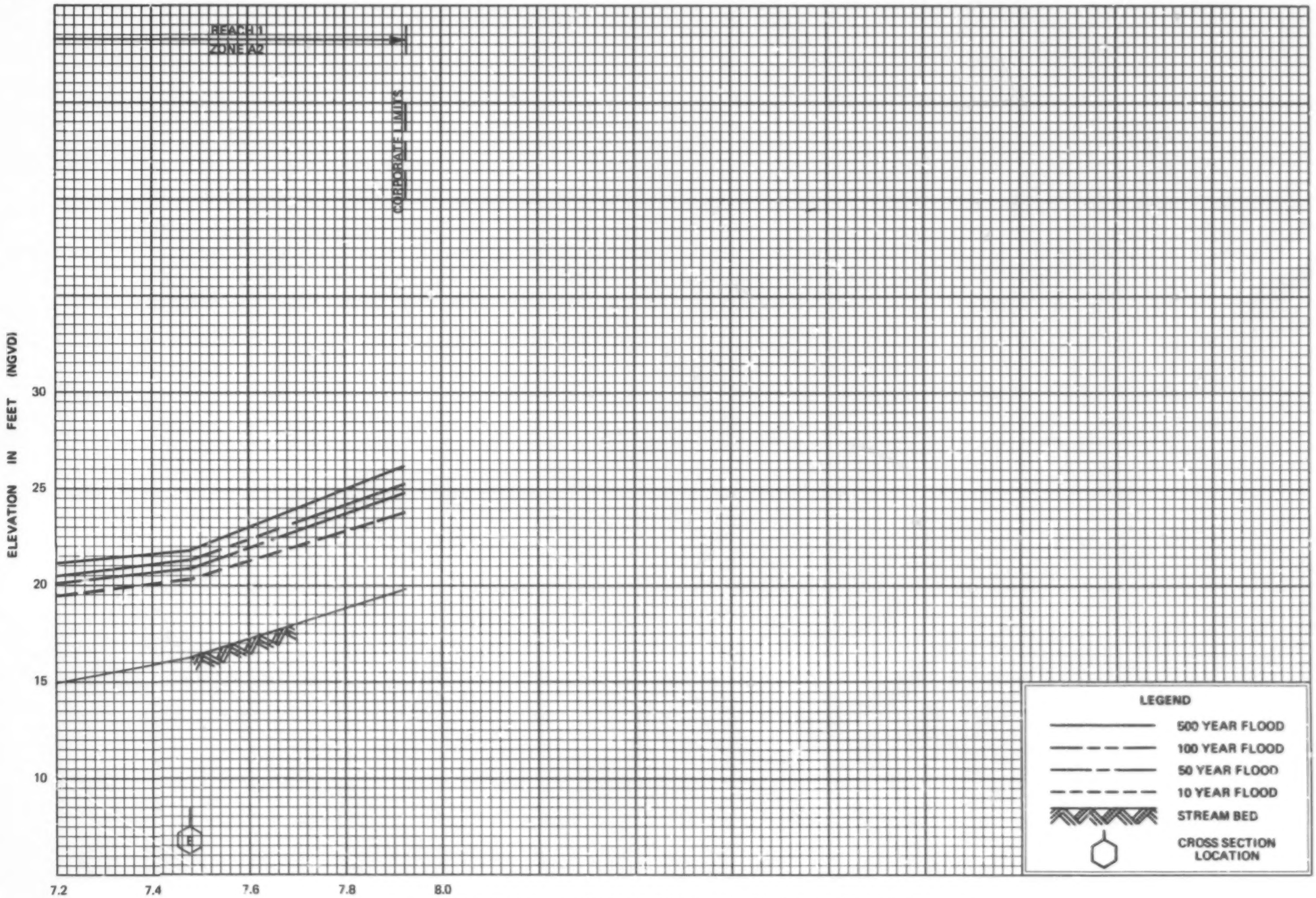

FLOOD PROFILES

COLES BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

28P

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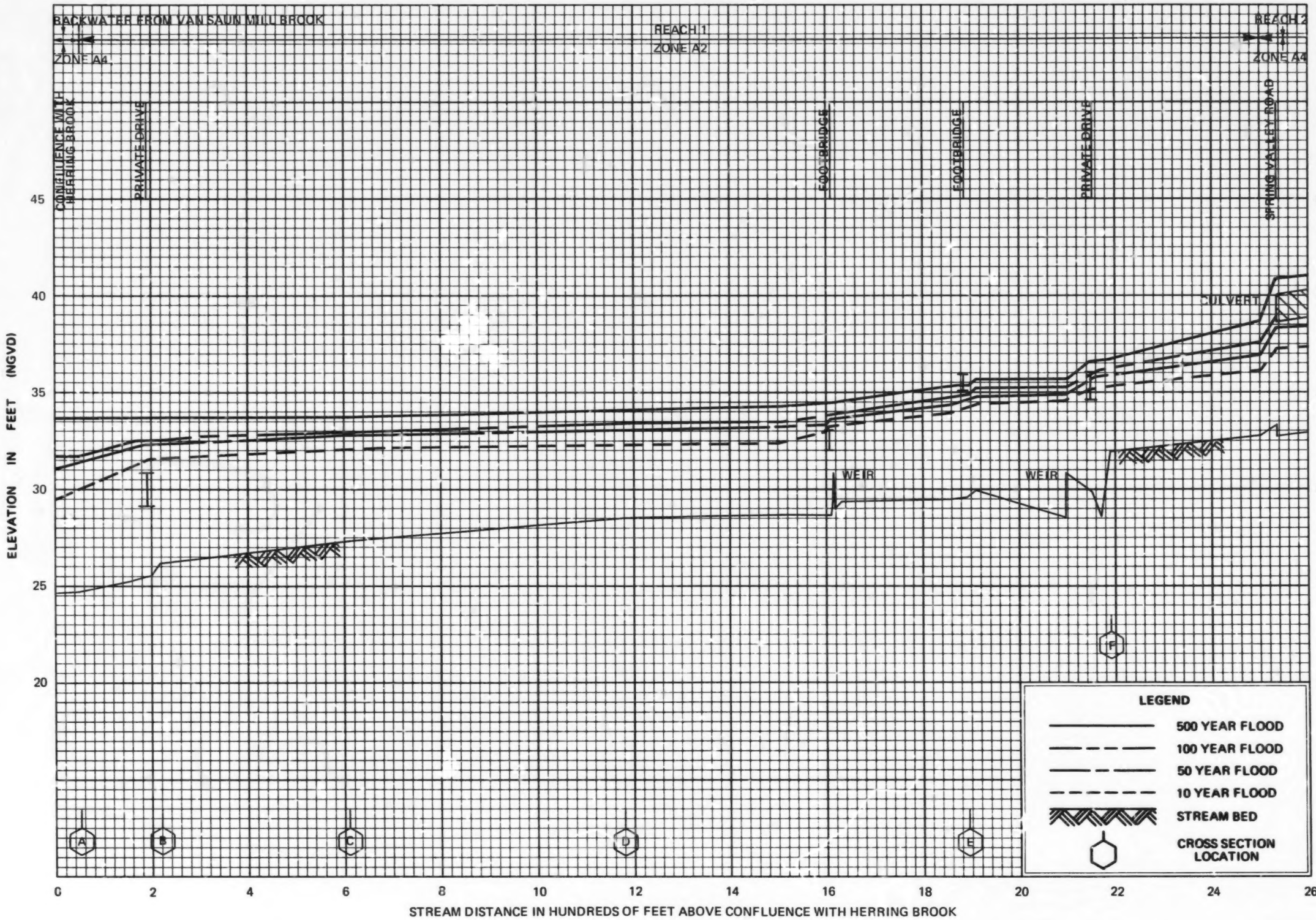


FLOOD PROFILES

BEHNKE BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

29P

BEST COPY AVAILABLE

REACH 2
ZONE A4

REACH 3
ZONE A2

REACH 4
ZONE A4

REACH 5
ZONE A2

FOREST AVENUE

FOOTBRIDGE

CLARKSON COURT

DAM

CULVERT

CULVERT

CULVERT

ELEVATION IN FEET (NGVD)

60
55
50
45
40
35
30

26 28 30 32 34 36 38 40 42 44 46 48 50 52

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE CONFLUENCE WITH HERRING BROOK

G H I J K

LEGEND

500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION

FLOOD PROFILES

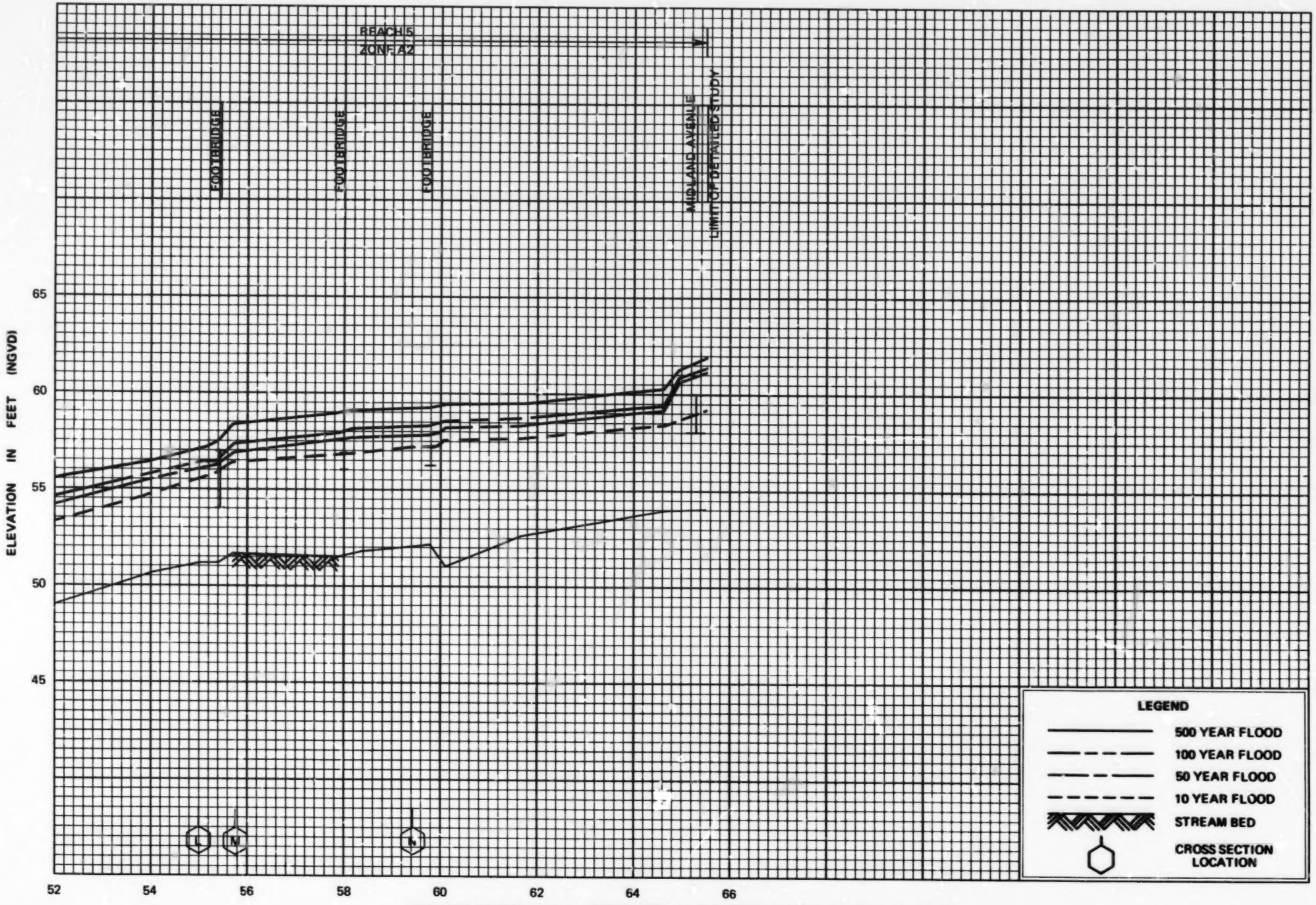
BEHNKE BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

30P

BEST COPY AVAILABLE



FLOOD PROFILES

BEHNKE BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

31P

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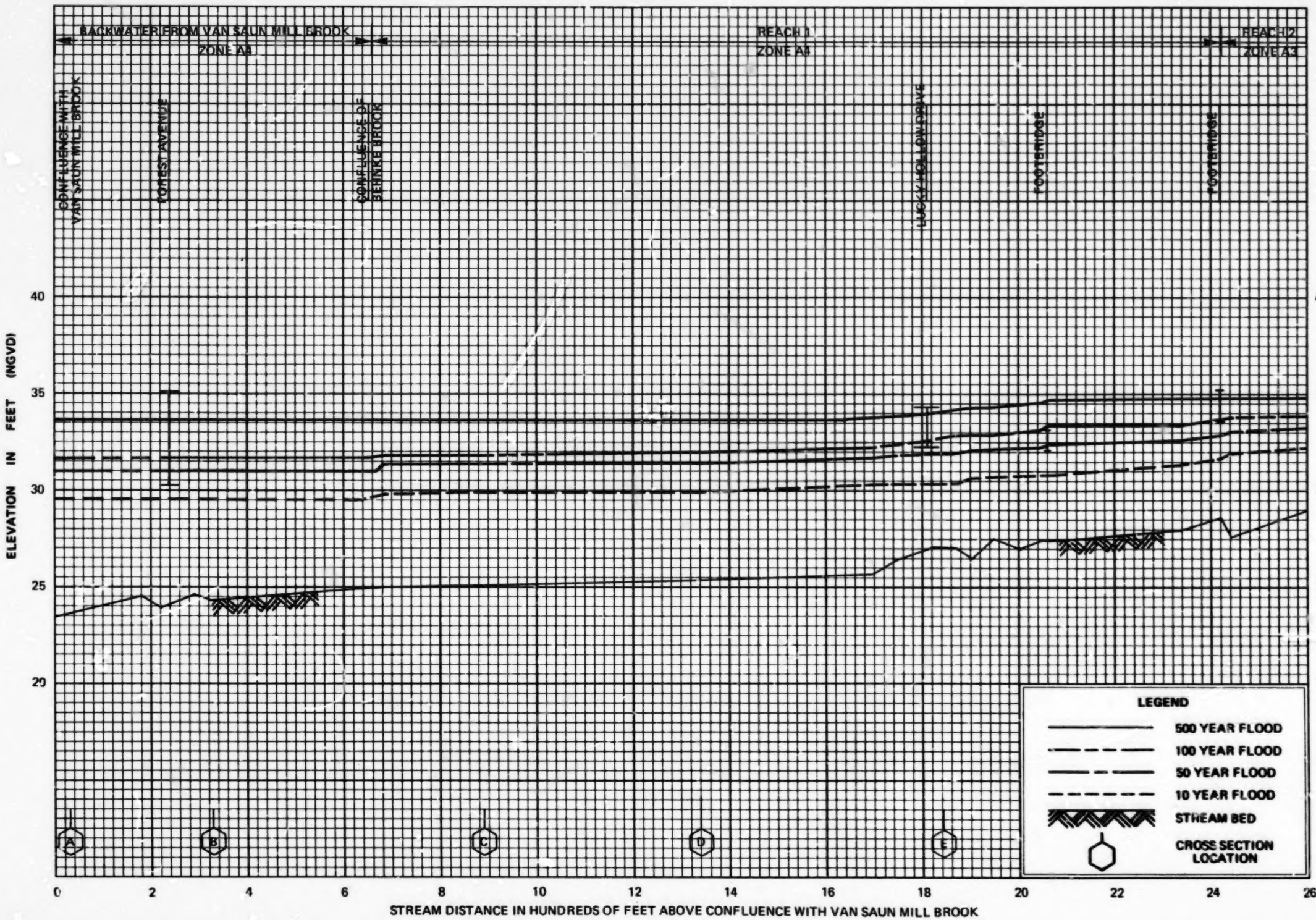

FLOOD PROFILES

HERRING BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

32P

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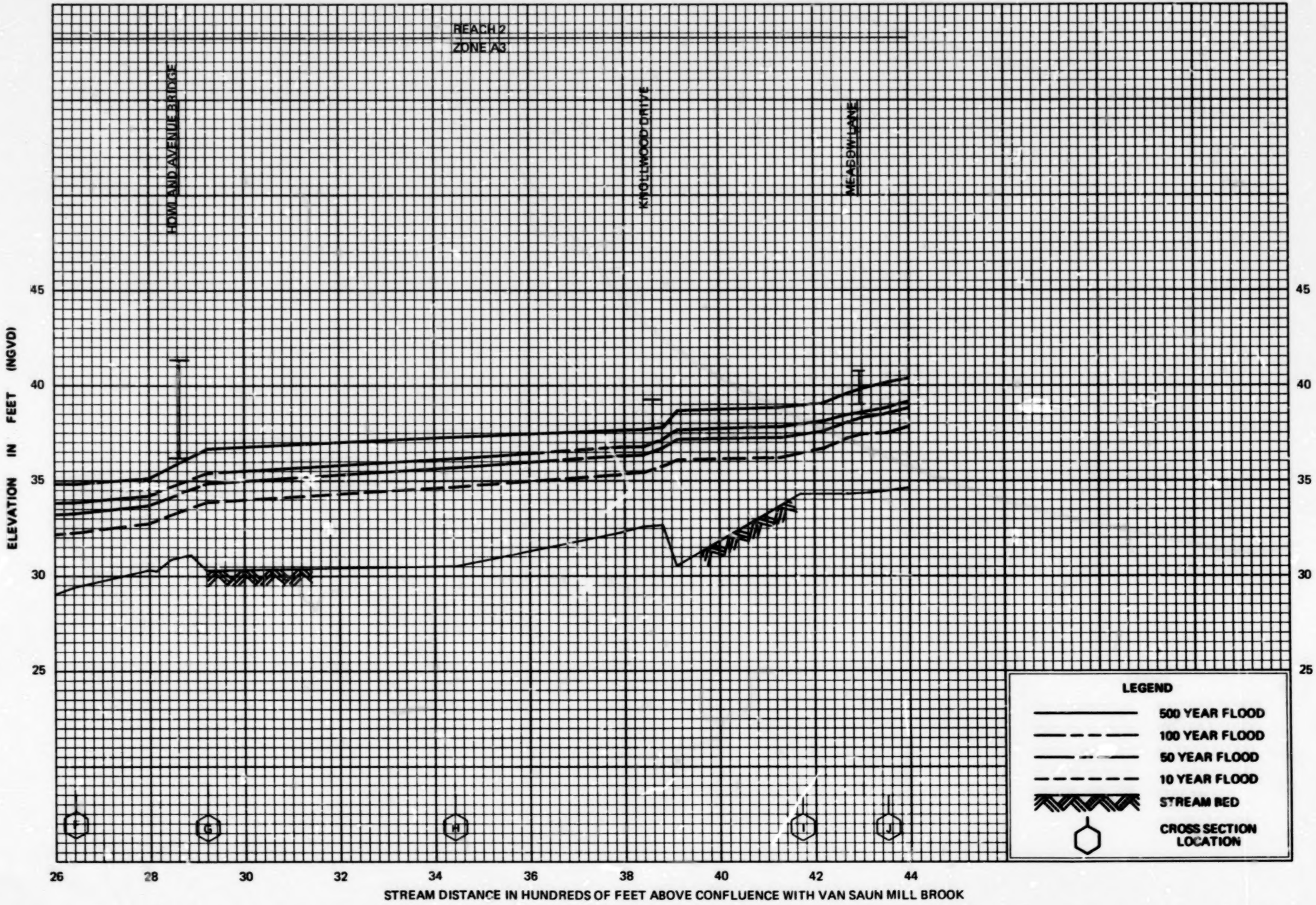

FLOOD PROFILES

HERRINS BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

33P

BEST COPY AVAILABLE

FLOOD PROFILES

HERRING BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF PARAMUS, NJ
(BERGEN CO.)

34P

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